STUDENT HANDBOOK

ENVIRONMENTAL SCIENCE PROGRAM

Revision 04-2013

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COLLEGE OF SCIENCES AND MATHEMATICS
Graduate Program in Environmental Science

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Dear Students:

Welcome to Arkansas State University and the Graduate Program in Environmental Science. We are excited that you have selected our program in Environmental Science (EVS). This is a competitive program and we congratulate you for being admitted. You have potential to develop as an independent researcher and we look forward to your participation in our program.

This handbook is intended to assist you in navigating your way through the EVS 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, feel free to contact me.

Best wishes,

Tanja McKay, Ph.D.,
Associate Professor and Director of the Graduate Program in Environmental Science

PREFACE

The ***ASU Graduate Bulletin***, the ***ASU Student Handbook*** and other guidelines referenced herein are the primary sources of information regarding academic and research policies and procedures at ASU. This ***Handbook*** is a supplement designed specifically for PhD, MS (Thesis) and MS (Practicum) students in the Environmental Science Program and does not replace or preempt the information provided in the previously listed publications. All EVS students are responsible for being informed about all academic and research requirements. EVS 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 mission of the cross-disciplinary Environmental Science Program is to produce scientists with the knowledge needed to support the assessment, maintenance and recovery of environmental resources. This includes an appreciation of the economic, social, political and aesthetic context that shapes our interaction with and knowledge of the environment. Measuring and understanding the balance between environmental protection, sustainable resource management, and economic growth is a major integrating theme within the program. There are three degrees offered in Environmental Science: PhD, MS (Thesis) and MS (Non-thesis: Practicum). Each student (either PhD or MS) is required to take courses in three categories, but the course of study for each student can be adapted to each student's interests and career goals.

B. PhD DEGREE IN ENVIRONMENTAL SCIENCE

PhD Program in Environmental Science		
TIMELINE	**EVENT**	**NOTES**
By end of 1st semester	Select Research Advisor	Most EVS students will have entered the program having already chosen a Research Advisor. Submit *Selection of a PhD Advisor* form (Form 1)
By end of 1st semester	Read, sign and submit the *Student Intellectual Property Agreement* form (Form 2)	Form 2 will be on file with the Office of Research and Technology Transfer at ASU and a copy should be sent to the EVS office
By end of 2nd semester	1. Select a PhD Advisory (Dissertation) Committee 2. PhD Proposed Program of Study approved by PhD Advisory Committee 3. Set date for Qualifying Examinations (Core Qualifying Exam and Specialty Area Qualifying Exam)	1. Submit *Request for Dissertation Committee Form* (Form 3) 2. Submit *PhD Proposed Program of Study Form* to EVS office (Form 4) 3. Submit *EVS PhD Qualifying Exams Intent Form* (Form 5)
By end of 3rd semester	A draft of the Dissertation Proposal should be completed	
By end of 4th semester	1. Results of the Qualifying Examinations must be submitted 2. Dissertation research proposal to PhD Advisory Committee (Submitted at least two weeks prior to Dissertation Proposal Seminar) 3. Dissertation Proposal Seminar (public) and Defense 4. Results of the Dissertation Proposal Seminar & Defense must be submitted 5. Complete PhD core course requirements	1. Submit *EVS PhD Qualifying Examination Results Form* (Form 6) 2. The dissertation research proposal is focused on student's intended research. Submit Seminar Announcement to EVS office two weeks prior to presentation 3. Submit *EVS PhD Dissertation Proposal Seminar & Defense Intent Form* (Form 7) 4. Submit *EVS PhD Dissertation Proposal Seminar Result Form* (Form 8) and *EVS PhD Dissertation Proposal Defense Result Form* (Form 9)

By the beginning of the 5th semester	On successful completion of the above requirements, the student can advance to candidacy	Submit *EVS Recommendations for Advancement to Candidacy Form* (Form 10) to EVS office
By the end of the 8th semester (last semester)	1. Dissertation to Committee (21 days before defense date); Schedule public defense of dissertation 2. Dissertation Defense	1. Submit *EVS Dissertation Defense & Comprehensive Examination Intent Form* (Form 11) to EVS office 2. After successful defense and comprehensive exam, submit *EVS Dissertation Defense Result Form* (Form 12) and *EVS Comprehensive Result Form* (Form 13) to the EVS office 3. Submit Intent to Graduate Card to Graduate School at the beginning of the semester in which you expect to graduate 4. Submit *EVS Dissertation Approval Form* (Form 14) to the EVS office 5. After *EVS Dissertation Approval Form* has been signed by the Dean of the College of Science and Mathematics, submit dissertation to Graduate School

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 his/her 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.

EVS PhD Forms 1-14 are available on the EVS website and from the EVS office. An *EVS PhD Student and Advisor Checklist* is available to help guide the student and advisor on all requirements needed for the program.

C. PhD COURSE REQUIREMENTS

Environmental Science has a number of recommended courses that are designed to provide all students with a cross-disciplinary overview of environmental science. PhD students are required to complete the PhD core course requirements by the end of the 4th semester. PhD students are required to take one class in each of three core categories:

1. Environmental Chemistry/Soil and Water Science
   - CHEM 5043 Environmental Chemistry
   - PSSC 4713/5713 Soil Quality Assessment and Interpretation
   - PSSC 4853/5853 Soil and Water Conservation
   - PSSC 4813/5813 Soil Fertility
   - GEOG 4633/5633 Climatology
2. Environmental Policy, Law & Economics
   - POSC 6173 Environmental Policy Processes
   - POSC 5533 Environmental Law and Admin
   - ECON 6353 Environmental Economics
3. Interdisciplinary Environmental Studies
   - BIO 6623 & 6621 Case Studies in Ecosystem Management Lecture and Lab
   - BIO 5613 Conservation Biology
   - ESCI 6303 Global Water Issues
   - AGRI 6243 Environmental Sustainability

Additional Requirements:

Ethics (1 hour; taken within the first year)

ESCI 7151 Responsible Conduct in Research

Seminars (4 hours, at least 2 hours of Topical Seminar)

ESCI 7111 Environmental Science Seminar
ESCI 7121 Topical Seminar in Environmental Sciences

Statistics (6 hours)

STAT 6613 Nonparametric Statistics
STAT 6623 Statistical Methods with SAS Programming
STAT 6643 Multivariate Analysis
STAT 6653 Data Analysis I: Regression Analysis
STAT 6663 Data Analysis II: Analysis of Variance (ANOVA)
STAT 6673 Design of Experiments
STAT 6833 Biostatistics
AGRI 6213 Experimental Designs
AGRI 5233 Experimental Agricultural Statistics
BIO 5683 Biological Data Analyses
BIO 6603 & 6601Environmental Systems Analysis Lecture and Lab

Dissertation (18 hours after attaining Candidacy)

ESCI 889V-1-12 hours Dissertation

Substitution of equivalent courses may be made upon the recommendation of the PhD Advisory Committee with the approval of the Environmental Science Graduate Program Committee. 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 Environmental Science 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.

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 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 form* (Form 1) is filed in the EVS office. Students must also read, sign and submit the *Student Intellectual Property Agreement* form (Form 2) which will be on file with the Office of Research and Technology Transfer at ASU. A copy should be submitted to the EVS 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. The student and advisor should notify the EVS 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 the student to inquire about and consider carefully the ability of a given potential faculty advisor to support new students entering their research group. Students should 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 or the Graduate School and as a Research Assistantship funded by extramural grants. Students should inquire about existing and pending research grants of the faculty member and about fellowships and scholarships available from external sources for which they 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 EVS office.

D-2 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 Research Advisor should assemble a PhD Advisory (Dissertation) Committee. EVS PhD Advisory Committees are comprised of a minimum of five members with at least one member from both the natural and social sciences. One member may be external to the institution, but must have adjunct graduate faculty status. After consultation with the Research Advisor and with prospective Advisory Committee members, the *Request for Dissertation Committee* form (Form 3) 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 course program and discussion of specialty area requirements.
2. Determining the nature of the qualifying 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. Review of performance in teaching, course work, examinations, and research.
5. Recommendations to the EVS Program Committee regarding a student's progress.
6. Recommending to the Director of the Graduate Program in Environmental Science the inclusion or exclusion of previous graduate level coursework as part of the Program of Study.
7. Assist the Research Advisor in guiding the student's dissertation research, evaluating the research, determining if the research is appropriate for earning the PhD degree in Environmental Science, 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 EVS Program Director. The student will then submit the *Petition to Change PhD Advisory Committee* form. This form is available from the EVS 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. Be aware that it is virtually impossible (by Graduate School 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 Graduate School also requires that a minimum of ten weeks pass before retaking a qualifying exam.

The EVS Program recommends a minimum of one formal meeting of the student, their Research Advisor and their PhD 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 PhD Advisory Committee.

D-3 PhD Program of Study

The *PhD Proposed Program of Study Form* (Form 4) 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 PhD 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 *PhD Proposed Program of Study Form* no later than the end of the second semester of residence. If changes in the Course of Study become necessary, they must be approved by the PhD Advisory Committee and a revised version of the *PhD Proposed Program of Study* form submitted to the EVS Program office. This form is available on the EVS website and should be completed after the Program of Study has been approved by your Research Advisor and PhD Advisory Committee.

D-4 PhD Qualifying Examinations

At the same time that the PhD Proposed Program of Study Form (by the end of the second semester) is submitted, students should submit the *EVS PhD Qualifying Exams Intent Form* (Form 5). This informs the EVS Program office when and how the two examinations required for the program will be conducted. The two examinations are as follows:

> Examination #1: Core Qualifying Examination
> PhD students will complete one qualifying examination in an area covered by the core courses that is outside of the student's emphasis area. This examination is typically oral in nature. Students must arrange to take this examination with one of the core instructors in either the third or fourth semester. Possible outcomes of this qualifying examination are i) pass, ii) fail with option to retake (one time only) the examination, or iii) fail.
>
> Examination #2: Specialty Area Qualifying Examination
> Each student, prior to their PhD proposal defense, will take an examination within their specialty area which is administered by their committee or a portion thereof. Students should meet with their committee examiners to discuss timing, content and structure of the examination prior to sitting for the examination. This exam can be conducted either orally, written or have both an oral and written component. Possible outcomes of this qualifying examination are i) pass, ii) fail with option to retake (one time only) the examination, or iii) fail.

The purpose of the qualifying examinations is to evaluate whether the student has begun to acquire the skills necessary to complete and defend a PhD dissertation appropriate to the student's degree plan. Students who fail initially or after the second attempt of these examinations will be reclassified to the EVS MS Program and will be re-considered for the PhD Program only under extraordinary circumstances. It should be noted that if a student should need to retake the quailing examinations, the Graduate School requires at least ten calendar weeks before the exam(s) can be retaken. 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. These examinations must be completed prior to the end of the fourth semester in residence. The *EVS PhD Qualifying Examinations Results Form* (Form 6) must be filed with the EVS Program office.

D-5 Dissertation Proposal, Seminar and Defense

By the end of the fourth year in residence the dissertation proposal should be completed and submitted to the PhD Advisory Committee. The dissertation proposal will describe the student's intended research and must describe the background and current status of the student's research problem. This document must first be approved by the Research Advisor before Advisory Committee review.

Timing of Dissertation Proposal Seminar and Defense: A final draft of the dissertation proposal must be submitted to the Advisory Committee at least two weeks before the dissertation proposal seminar and defense. The dissertation proposal cannot be signed off on unless the Advisory Committee has had the proposal for at least two weeks for review. The proposal seminar and defense can only occur after successfully completing the qualifying examinations. 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 Program Office of the proposal defense a minimum of 2 weeks prior to the defense. The *EVS PhD Dissertation Proposal Seminar & Defense Intent Form* (Form 7) must be filed with the EVS Program office. A seminar announcement to the EVS office must also be submitted two weeks prior to the scheduled seminar.

Dissertation Proposal Seminar and Defense Results: Each PhD student must successfully present their PhD dissertation 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 PhD Advisory Committee will suggest a course of action to rectify any perceived deficiency. Results of the proposal seminar must be filed with the EVS Program office using the *EVS PhD Dissertation Proposal Seminar Result Form* (Form 8).

After the seminar is presented and questions from the audience have been addressed, the 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 environmental science. Possible outcomes of the proposal defense are i) pass, or ii) fail. If a student fails the defense portion, the PhD Advisory Committee will suggest a course of action to rectify any perceived deficiency. Results of the closed door questioning must be filed with the Program Office using the *EVS PhD Dissertation Proposal Defense Result Form* (Form 9). If the student passed the seminar and defense but needs to incorporate suggested revisions into the dissertation proposal, Form 9 SHOULD NOT be submitted until the proposal is satisfactorily completed. The dissertation proposal cannot be signed off on unless the Advisory Committee has had the proposal for at least two weeks for review. It should also be noted that if the Advisory Committee recommends a retake of the closed door, proposal defense examination, the Graduate School requires that ten calendar weeks must pass before a retake of the examination can be scheduled.

PhD students *who have not defended their proposal by the end of the fifth semester or who have not passed by the end of their fifth semester will no longer be in good standing in the PhD Program.* They will be reclassified into the MS Program and will be reconsidered for the PhD Program only under extraordinary circumstances.

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 EVS Program. Such explanations must contain a new proposed qualifying and/or proposal defense deadline. In all cases the oral defense of the dissertation proposal must be passed by the end of the seventh semester.

For those EVS PhD students who become reclassified into the MS Program and later reinstated into the PhD Program, the deadline for passing the dissertation proposal defense shall be: (1) the original deadline specified in the student's Program of Study or (2) 5 months after readmission to the EVS PhD program, whichever comes later. Students not passing the dissertation proposal defense by the deadline shall be reclassified to the EVS MS Program again and this reclassification will be final.

D-6 Advancement to PhD Candidacy

By the beginning of the 5th 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. Passing both qualifying examinations
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 *EVS Recommendation for Advancement to Candidacy Form* (Form 10) with the EVS Program office. This form will then be submitted to the Dean of the Graduate School. After verification that all requirements have been met, the Dean of the Graduate School will notify the candidate of advancement to Candidacy status.

Once reaching Candidacy, it is difficult for the student to change Research Advisors. Only under extreme circumstances can a change in an advisors occur and only with the permission of the Program Committee.

Doctoral students, upon reaching PhD Candidacy, are granted an MS in Environmental Science provided they have met the requirements above. Students who intend to earn an MS in Environmental Science must complete an *Intent to Graduate Card* in the semester they will attain Candidacy from the Graduate School.

Dissertation Credits: As noted on page 9 under Course Requirements, PhD students are required to register for a minimum of 18 dissertation credits after attaining Candidacy.

D-7 Dissertation Defense

By the end of the 8th semester, 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 that of the dissertation proposal defense.

Timing of Dissertation Seminar and Defense: A completed draft of the dissertation must be first approved by the Research Advisor before the dissertation 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 Comprehensive Examination). Students must notify the EVS Program Office of the dissertation defense a minimum of 2 weeks prior to the defense. The student must submit the *EVS Dissertation Defense and Comprehensive Examination Intent Form* (Form 11) to the EVS Program office. A Seminar

Announcement to the EVS office must also be submitted and the Graduate School notified no less than two weeks prior to the defense.

Dissertation Defense and Comprehensive Examination: Each PhD candidate must successfully present their PhD dissertation 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 dissertation and an oral Comprehensive Examination. For the comprehensive examination, the Advisory Committee will ask additional questions which can include topics such as coursework, seminars, current literature or other matters of timely interest to environmental science. Results of the closed door questioning must be filed with the Program office using the *EVS Dissertation Defense Result Form* (Form 12) and the *EVS Comprehensive Result Form* (Form 13). If the student fails to successfully complete the dissertation defense, the PhD Advisory Committee can reclassify the student to the MS Program or they may recommend that the student be dismissed from the EVS Program. Possible outcomes of the comprehensive examination are i) pass, or ii) fail with option to retake (one time only). Students who retake the comprehensive examination and fail after the second attempt will be reclassified to the MS Program and will not be reconsidered for the PhD Program. It should be noted the Graduate School requires ten calendar weeks must pass before a retake of the examination can be scheduled. Results of the dissertation defense and comprehensive examination must also be filed with the Program Office the day of the defense.

All members of the PhD Advisory Committee must be in attendance for the Defense and Comprehensive Examination. 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 EVS 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 PhD Advisory Committee regarding their willingness to give the final oral comprehensive examination.

D-8 Dissertation

Each semester the Graduate School establishes a deadline for submission of completed dissertations. The dissertation cannot be submitted to the Graduate School before the *EVS Dissertation Approval Form* (Form 14) has been signed by the PhD Advisory Committee members, the EVS Program Director and the Dean of the College of Sciences and Mathematics.

The dissertation must adhere to Graduate School 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 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. 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) Bibliography. The final chapter of the dissertation should 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 is well in excess of 100 pages.

D-9 Summary of PhD Requirements

EVS PhD students are required to complete the PhD core course requirements, which include taking one class in each of three categories: Environmental Chemistry/Soil and Water Science, Environmental Policy, Law & Economics, and Interdisciplinary Environmental Studies. Each student will also take 1 credit hour of Ethics, 4 credit hours of Seminar, 6 credit hours of Statistics 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 Environmental Science 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 EVS students, there are two public defenses: 1) dissertation proposal and 2) dissertation defense of their completed research. Each of these defenses is followed by an oral examination given by the PhD Advisory Committee. Two qualifying examinations and a final comprehensive examination are also required. 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. The student must also have acquired sufficient knowledge in the research area and at least one area of environmental science. 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 Environmental Science.

E. MS THESIS DEGREE IN ENVIRONMENTAL SCIENCE

MS (Thesis) Program in Environmental Science		
TIMELINE	**EVENT**	**NOTES**
By end of 1st semester	Select Research Advisor	Most EVS students will have entered the program having already chosen a Research Advisor. Submit *Selection of a MS Thesis Advisor* form (Form 1)
By end of 1st semester	Read, sign and submit the *Student Intellectual Property Agreement* form (Form 2)	Form 2 will be on file with the Office of Research and Technology Transfer at ASU and a copy submitted to the EVS Office
By end of 2nd semester	1. Select a MS Thesis Advisory Committee 2. MS Proposed Program of Study approved by MS Advisory Committee 3. Set date for Qualifying Examination 4. MS Thesis Proposal to MS Advisory Committee (Submitted at least two weeks prior to MS Proposal Seminar) 5. MS Proposal Seminar (public) and Defense 6. Results of the MS Proposal Seminar & Defense must be submitted	1. Submit *Request for MS Thesis Advisory Committee Form* (Form 3) 2. Submit *MS Proposed Program of Study Form* to EVS office (Form 4) 3. Submit *EVS MS Qualifying Exam Intent Form* (Form 5) 4. The MS Thesis Proposal is focused on student's intended research. Submit Seminar Announcement to EVS office two weeks prior to presentation 5. Submit *EVS MS Thesis Proposal Seminar & Defense Intent Form* (Form 7) 6. Submit *EVS MS Proposal Seminar Result Form* (Form 8). Submit *EVS MS Thesis Proposal Defense Result Form* (Form 9)
By end of 3rd semester	Results of the Qualifying Examination must be submitted	Submit *EVS MS Qualifying Examination Results Form* (Form 6)
By end of 4th semester	1. Complete MS core course requirements 2. MS Thesis to Committee; Schedule public defense of thesis 3. MS Thesis defense and completion of Thesis	1. Submit Intent to Graduate Card to Graduate School at the beginning of the semester in which you expect to graduate 2. Submit *EVS MS Thesis Defense Intent Form* (Form 10) to EVS office; Submit *EVS MS Thesis Defense Result Form* (Form 11) 3. After successful defense and completed edits from Advisory Committee, submit *EVS MS Thesis Approval Form* (Form 12) to the EVS Office 4. After the *EVS MS Thesis Approval Form* has been signed by the Dean of the College of Science and Mathematics, submit Thesis to Graduate School

There are a series of projects and examinations designed to prepare and test the student's potential for success in the MS (Thesis) Program. The student needs to talk to the Research Advisor to ensure that he/she knows the steps and the importance of each. In general there is a Thesis

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.

EVS MS (Thesis) Track Forms 1-12 are available on the EVS website and from the EVS Office. An EVS *MS (Thesis) Student and Advisor Checklist* is available to help guide the student and advisor on all requirements needed for the program.

F. MS THESIS COURSE REQUIREMENTS

Environmental Science has a number of recommended courses that are designed to provide all students with a cross-disciplinary overview to environmental science. MS students are required to complete the core course requirements by the end of the 4th semester. MS students are required to take one class in each of three core categories:

1. Environmental Chemistry/Soil and Water Science
   - CHEM 5043 Environmental Chemistry
   - PSSC 4713/5713 Soil Quality Assessment and Interpretation
   - PSSC 4853/5853 Soil and Water Conservation
   - PSSC 4813/5813 Soil Fertility
   - GEOG 4633/5633 Climatology
2. Environmental Policy, Law & Economics
   - POSC 6173 Environmental Policy Processes
   - POSC 5533 Environmental Law and Admin
   - ECON 6353 Environmental Economics
3. Interdisciplinary Environmental Studies
   - BIO 6623 & 6621 Case Studies in Ecosystem Management Lecture and Lab
   - BIO 5613 Conservation Biology
   - ESCI 6303 Global Water Issues
   - AGRI 6243 Environmental Sustainability

Additional Requirements:

Ethics (1 hour; taken within the first year)
- ESCI 7151 Responsible Conduct in Research

Seminars (2 hours, at least 1 hour of Topical Seminar)
- ESCI 7111 Environmental Science Seminar
- ESCI 7121 Topical Seminar in Environmental Sciences

Statistics (6 hours)
- STAT 6613 Nonparametric Statistics
- STAT 6623 Statistical Methods with SAS Programming
- STAT 6643 Multivariate Analysis
- STAT 6653 Data Analysis I: Regression Analysis
- STAT 6663 Data Analysis II: Analysis of Variance (ANOVA)
- STAT 6673 Design of Experiments
- STAT 6833 Biostatistics
- AGRI 6213 Experimental Designs
- AGRI 5233 Experimental Agricultural Statistics
- BIO 5683 Biological Data Analyses
- BIO 6603 & 6601Environmental Systems Analysis Lecture and Lab

Thesis hours (6 hours)
- ESCI 689V 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 required for the MS in Environmental Science 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.

G. MS Thesis Key Concepts

G-1 MS 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 and could risk dismissal from the program. After consultation with the Research Advisor, the *Selection of a MS (Thesis) Advisor Form* (Form 1) is filed in the EVS office. Students must also read, sign and submit the *Student Intellectual Property Agreement* form (Form 2) which will be on file with the Office of Research and Technology Transfer at ASU. A copy should be submitted to the EVS Office.

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. The student and advisor should notify the EVS Program Office as soon as a selection has been made. It is important and entirely appropriate for the student to inquire about and consider carefully the ability of a given potential faculty advisor to support new students entering their research group. Students should 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 are provided by a Teaching Assistantship from a host department or the Graduate School and as a Research Assistantship funded by extramural grants. Students should inquire about existing and pending research grants of the faculty member and about fellowships and scholarships available from external sources for which they 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 EVS Office.

G-2 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. EVS MS Advisory Committees are comprised of a minimum of four members with at least one member from both the natural and social sciences. One member may be external to the institution, but must have adjunct graduate faculty status. After consultation with the Research Advisor and with prospective Advisory Committee members, the *Request for MS (Thesis) Committee Form* (Form 3) 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 EVS Program Committee regarding a student's progress.
6. Recommending to the Director of the Graduate Program in Environmental Science 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 Environmental Science, 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 EVS Program Director. The student will then submit the *Petition to Change MS Advisory Committee* form. This form is available from the EVS 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 EVS 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.

G-3 MS Program of Study

The *MS Proposed Program of Study Form* (Form 4) 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 second semester of residence. 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 EVS Program office. This form is available on the EVS website and should be completed after the Program of Study has been approved by your Research Advisor and MS Advisory Committee.

G-4 MS Qualifying Examination

At the same time the MS Proposed Program of Study Form (by the end of the second semester) is submitted, students should submit the *EVS MS Qualifying Exam Intent Form* (Form 5). This informs the EVS Program office when and how the examination required for the Program will be conducted. The exam details are as follows:

> Each student, prior to their MS proposal defense, will take an examination within their specialty area, which is administered by their committee or a portion thereof. Students should meet with their committee examiners to discuss timing, content and structure of the examination prior to sitting for the examination. This exam can be conducted either orally, written or have both an oral and written component. Possible outcomes of this qualifying examination are i) pass, ii) fail with option to retake (one time only) the examination, or iii) fail.

The purpose of the qualifying examination is to evaluate whether the student has begun to acquire the skills necessary to complete and defend a MS Thesis appropriate to the student's degree plan. Students who fail initially can have the option to retake the exam. It should be noted the Graduate School requires at least ten calendar weeks must pass before a retake of a qualifying examination can be scheduled. If the MS Advisory Committee feels the student would benefit from additional course work, they may also require the successful completion of additional courses. If a student fails to pass this examination, the student may be re-assigned to the Practicum track or may no longer be in good standing with the program and may lose graduate student status at the discretion of the MS Advisory Committee. This examination must be completed prior to the end of the third semester in residence. The *EVS MS Qualifying Examination Results Form* (Form 6) must be filed with the EVS Program office.

G-5 Thesis Proposal, Seminar and Defense

By the end of the second 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.

> <u>Timing of Thesis Proposal Seminar and Defense:</u> 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 EVS Program Office of the proposal defense a minimum of 2 weeks prior to the defense. The *EVS MS Thesis Proposal Seminar & Defense Intent Form* (Form 7) must be filed with the EVS Program Office. A Seminar Announcement to the EVS 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 EVS Program Office using the *EVS Thesis Proposal Seminar Result Form* (Form 8).

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 environmental science. 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 EVS Program Office using the *EVS MS Thesis Proposal Defense Result Form* (Form 9). If the student passed the seminar and defense but needs to incorporate suggested revisions into the Thesis Proposal, Form 9 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, the Graduate School 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.* They will be reclassified into the MS Practicum Program and will be reconsidered for the MS Thesis Program only under extraordinary circumstances.

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 EVS Program. Such explanations must contain a new proposed qualifying and/or proposal defense deadline.

G-6 MS Thesis Defense

By the end of the 4th 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 his or her 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 EVS Program Office of the thesis defense a minimum of 2 weeks prior to the defense. The student must submit the *EVS MS Thesis Defense Intent Form* (Form 10) to the EVS Program office. A seminar announcement to the EVS Program Office must also be submitted and the Graduate School notified 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 environmental science. Results of the closed door questioning must be filed with the EVS Program Office using the *EVS Thesis Defense Result Form* (Form 11). 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 11 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 EVS 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 Graduate School establishes a deadline for submission of completed theses. The thesis cannot be submitted to the Graduate School before the *EVS MS Thesis Approval Form* (Form 12) has been signed by the MS Advisory Committee members, the EVS Program Director and the Dean of the College of Sciences and Mathematics.

The thesis must adhere to Graduate School 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) Bibliography. 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 MS Thesis Requirements

EVS MS Thesis students are required to complete a Thesis project and all MS core course requirements, which include taking one class in each of three categories: Environmental Chemistry/Soil and Water Science, Environmental Policy, Law & Economics, and Interdisciplinary Environmental Studies. Each student will also take 1 credit hour of Ethics, 2 credit hours of Seminar, 6 credit hours of Statistics and 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 required for the MS in Environmental Science 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. For MS Thesis Track EVS students 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. One qualifying examination is also required. 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 resolution of the problem. 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 and at least one area of Environmental Science. 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 Environmental Science.

H. MS PRACTICUM DEGREE IN ENVIRONMENTAL SCIENCE

MS (Practicum) Program in Environmental Science		
TIMELINE	**EVENT**	**NOTES**
By end of 1st semester	Select Research Advisor	Most EVS students will have entered the program having already chosen a Research Advisor. Submit *Selection of a MS Practicum Advisor* form (Form 1)
By end of 1st semester	Read, sign and submit the *Student Intellectual Property Agreement* form (Form 2)	Form 2 will be on file with the Office of Research and Technology Transfer at ASU and a copy sent to the EVS Program Office
By end of 2nd semester	1. Select a MS Practicum Advisory Committee 2. MS Proposed Program of Study approved by MS Advisory Committee 3. Set date for Qualifying Examination 4. Student decides upon an internship related to their field of study	1. Submit *Request for MS Practicum Advisory Committee Form* (Form 3) 2. Submit *MS Proposed Program of Study Form* to EVS office (Form 4) 3. Submit *EVS MS Qualifying Exam Intent Form* (Form 5) 4. Chose Practicum Supervisor; submit *EVS MS Practicum Experience Intent Form* (Form 7)
By end of 3rd semester	1. Results of the Qualifying Examination must be submitted 2. Enroll in ESCI 614V (3 credit hours) Environmental Science Internship	1. Submit *EVS MS Qualifying Examination Results Form* (Form 6) 2. Start Internship EXTERNAL to the University
By end of 4th semester	1. Enroll in ESCI 614V (3 Credit Hours) Environmental Science Internship 2. Complete MS core course requirements 3. MS Practicum Report to Committee; Schedule public defense of Practicum	1. Submit Intent to Graduate Card to Graduate School at the beginning of the semester in which you expect to graduate 2. Practicum Supervisor submits *EVS MS Practicum Supervisor's Report* (Form 8) to EVS Program Office; Student submits *EVS MS Practicum Report Results Form* (Form 9) 3. Submit *EVS MS Practicum Defense Intent Form* (Form 10) to EVS office; Submit *EVS MS Practicum Defense Result Form* (Form 11)

There are a series of projects and examinations designed to prepare and test the student's potential for success in the MS Practicum Program. Students need to talk to their advisor to ensure that they know the steps and the importance of each. In general there is course work to be completed, an internship external to the university, a practicum report to be prepared and defended. The table above outlines the process which is discussed in more detail in the following paragraphs.

EVS MS (Practicum) Track Forms 1-11 are available on the EVS website and from the EVS office. An EVS MS (Practicum) Student and Advisor Checklist is available to help guide the student and advisor on all requirements needed for the program.

I. MS PRACTICUM COURSE REQUIREMENTS

Environmental Science has a number of recommended courses that are designed to provide all students with a cross-disciplinary overview to environmental science. MS practicum students are

required to complete the core course requirements by the end of the 4th semester. MS students are required to take one class in each of three core categories:

1. Environmental Chemistry/Soil and Water Science
   - CHEM 5043 Environmental Chemistry
   - PSSC 4713/5713 Soil Quality Assessment and Interpretation
   - PSSC 4853/5853 Soil and Water Conservation
   - PSSC 4813/5813 Soil Fertility
   - GEOG 4633/5633 Climatology
2. Environmental Policy, Law & Economics
   - POSC 6173 Environmental Policy Processes
   - POSC 5533 Environmental Law and Admin
   - ECON 6353 Environmental Economics
3. Interdisciplinary Environmental Studies
   - BIO 6623 & 6621 Case Studies in Ecosystem Management Lecture and Lab
   - BIO 5613 Conservation Biology
   - ESCI 6303 Global Water Issues
   - AGRI 6243 Environmental Sustainability

Additional Requirements:

Ethics (1 hour; taken within the first year)
- ESCI 7151 Responsible Conduct in Research

Seminars (2 hours, at least 1 hour of Topical Seminar)
- ESCI 7111 Environmental Science Seminar
- ESCI 7121 Topical Seminar in Environmental Sciences

Statistics (6 hours)
- STAT 6613 Nonparametric Statistics
- STAT 6623 Statistical Methods with SAS Programming
- STAT 6643 Multivariate Analysis
- STAT 6653 Data Analysis I: Regression Analysis
- STAT 6663 Data Analysis II: Analysis of Variance (ANOVA)
- STAT 6673 Design of Experiments
- STAT 6833 Biostatistics
- AGRI 6213 Experimental Designs
- AGRI 5233 Experimental Agricultural Statistics
- BIO 5683 Biological Data Analyses
- BIO 6603 & 6601Environmental Systems Analysis Lecture and Lab

Practicum/ Internships hours (6 hours; 3 hours taken in semester in which the practicum experience is going on, 3 hours in semester of intended graduation)
- ESCI 614V Environmental Sciences Internship (Practicum)

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 required for the MS in Environmental Science 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.

J. MS Practicum Key Concepts

J-1 MS Practicum 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 MS (Thesis) Advisor Form* (Form 1) is

filed in the EVS office. Students must also read, sign and submit the *Student Intellectual Property Agreement* form (Form 2) which will be on file with the Office of Research and Technology Transfer at ASU. A copy should be submitted to the EVS Office.

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. The student and advisor should notify the EVS Program Office as soon as a selection has been made. It is important and entirely appropriate for the student to inquire about and consider carefully the ability of a given potential faculty advisor to support new students entering their research group. Students should 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 are provided by a teaching assistantship from a host department or the Graduate School and as a research assistantship funded by extramural grants. Students should inquire about existing and pending research grants of the faculty member and about fellowships and scholarships available from external sources for which they 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 EVS office.

J-2 MS Practicum 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 Practicum Advisory Committee. EVS MS Practicum Advisory Committees are comprised of a minimum of four members with at least one member from both the natural and social sciences. One member may be external to the institution, but must have adjunct graduate faculty status. After consultation with the Research Advisor and with prospective Advisory Committee members, the *Request for MS Practicum Committee Form* (Form 3) is filed to request formation of a research committee. The MS Practicum 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 internship experience.
5. Recommendations to the EVS Program Committee regarding a student's progress.
6. Recommending to the Director of the Graduate Program in Environmental Science 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 practicum, evaluating the practicum, determining if the practicum is appropriate for earning the MS Practicum degree in Environmental Science, recommending the student for the MS Practicum degree.

Changes in the MS Practicum Advisory Committee: To petition for a change in the membership of their MS Advisory Committee, the student MUST gain approval of the EVS Program Director. The student will then submit the *Petition to Change MS Practicum Advisory Committee* form. This form is available from the EVS 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 EVS Program recommends a minimum of one formal meeting of the student, their Research Advisor and their MS Practicum 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 Practicum Advisory Committee.

J-3 MS Practicum Program of Study

The *MS Proposed Program of Study Form* (Form 4) 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 Practicum 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 second semester of residence. If changes in the Course of Study become necessary, they must be approved by the MS Practicum Advisory Committee and a revised version of the *MS Proposed Program of Study Form* submitted to the EVS Program office. This form is available on the EVS website and should be completed after the course of study has been approved by your Research Advisor and MS Practicum Advisory Committee.

J-4 MS Practicum Qualifying Examination

At the same time that the MS Proposed Program of Study Form (by the end of the second semester) is submitted, students should submit the *EVS MS Qualifying Exam Intent Form* (Form 5). This informs the EVS Program office when and how the examination required for the Program will be conducted. The exam details are as follows:

> Each MS Practicum student will take an examination within their specialty area which is administered by their committee or a portion thereof. Students should meet with their committee examiners to discuss timing, content and structure of the examination prior to sitting for the examination. This exam can be conducted either orally, written or have both an oral and written component. Possible outcomes of this qualifying examination are i) pass, ii) fail with option to retake (one time only) the examination, or iii) fail.

The purpose of the qualifying examination is to evaluate whether the student has begun to acquire the skills necessary to complete and defend a MS Practicum appropriate to the student's degree plan. Students who fail initially can have the option to retake the exam. It should be noted that the Graduate School requires at least ten calendar weeks must pass before a retake of a qualifying examination can be scheduled. If the MS Advisory Committee feels the student would benefit from additional course work, they may also require the successful completion of additional courses. If a student fails to pass this examination, the student may no longer be in good standing with the program and may lose graduate student status at the discretion of the MS Practicum Advisory Committee. This examination must be completed prior to the end of the third semester in residence. The *EVS MS Qualifying Examination Results Form* (Form 6) must be filed with the EVS Program office.

J-5 Internship Practicum Experience

By the end of the second year in residence, the student should decide upon an internship related to their field of study. This internship must be EXTERNAL to the University. The student must register for ESCI 614V Environmental Sciences Internship when performing the internship (3 credit hours) and three additional hours during the semester of intended graduation. Once an internship has been acquired, a Practicum Supervisor must be chosen and *EVS MS Practicum Experience Intent Form* (Form 7) completed and placed on file with the EVS Program Office. The student should keep a Practicum Journal which details the activities of the internship experience on a daily basis. Once the Practicum Experience has been completed, the Practicum Supervisor must prepare the *Supervisor's Practicum Report Form* (Form 8) describing the outcomes. Form 8 must be sent to the EVS Program Office.

J-6 Practicum Report

MS Practicum students are required to complete a final practicum report which will include a THOROUGH literature review of material relevant to the student's internship research and the results of the practicum experience. The Practicum Report must be submitted for review by the Practicum Supervisor. The student will be awarded a pass on the practicum only when the Practicum Supervisor and the student's Advisory Committee has approved the document. Once the practicum report has been approved by all, the EVS MS Practicum Report Results Form (Form 9) must be placed on file with the EVS Program Office.

The Practicum Report is not submitted to the Graduate School. However, a copy of the report should be bound and copies made for the Research Advisor and the EVS Program Office.

The Practicum Report should adhere to Graduate School Thesis 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 internship into historical and scientific context. This chapter may also contain information about specific techniques used in the conduct of the internship and is usually the longest chapter. 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) Practicum Chapter(s). The introduction is followed by a chapter(s) that describes the specificities of the internship project. The chapter(s) 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 internship, describe the unifying theme of the project, and highlight the most important findings of the project and how they contribute to the field. Project results should also be discussed in the context of the published results of similar studies. It should also contain a discussion of the importance and relevance of the internship and suggestions for future direction for potential research projects.

4) Bibliography. The final chapter of the practicum report should contain the references cited in all chapters of the report. 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 the practicum report must capture the internship the student has completed and provide sound evidence that the student has the necessary knowledge and sufficient critical thinking skills to advance toward completion of the Masters of Science Degree (Non-Thesis) in Environmental Science. Typically the length of practicum reports is well in excess of 40 pages.

J-7 MS Practicum Report Defense

By the end of the 4th semester, after completing an extensive internship project approved by the Research Advisor, the Practicum Supervisor, and MS Practicum Advisory Committee, the student is required to present the written practicum report to his or her MS Advisory Committee, and hold the final public practicum defense. The format of this defense is as follows:

Timing of Practicum Seminar and Defense: A completed draft of the Practicum Report must be first approved by the Research Advisor and Practicum Supervisor before the Practicum Report 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 EVS Program Office of the practicum defense a minimum of 2 weeks prior to the defense. The student must submit the *EVS MS Practicum Defense Intent Form* (Form 10) to the EVS Program Office. A seminar announcement to the EVS Program Office must also be submitted and the Graduate School notified no less than two weeks prior to the defense.

Practicum Defense: Each MS Practicum student must successfully present their Practicum Report 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 practicum. The Advisory Committee will ask additional questions which can include topics such as coursework, seminars, current literature or other matters of timely interest to environmental science. Results of the closed door questioning must be filed with the Program office using the *EVS Practicum Defense Result Form* (Form 11). If the student fails to successfully complete the practicum defense, the MS Practicum Advisory Committee can recommend a retake of the examination, or may recommend that the student be dismissed from the EVS Program. If the Advisory Committee concludes that the practicum report needs further revisions, Form 11 SHOULD NOT be submitted until the practicum is satisfactorily completed.

All members of the MS Practicum 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 EVS 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 Practicum Advisory Committee regarding their willingness to attend the practicum defense.

J-8 Summary of MS Non-Thesis (Practicum) Requirements

The Masters of Science in Environmental Science (Non-Thesis, Practicum) is designed to provide all students with a cross-disciplinary overview to environmental science. EVS MS Non-Thesis (Practicum) students are required to complete an internship external to the university. Students are also required to complete all MS core course requirements which include taking one class in each of three categories: Environmental Chemistry/Soil and Water Science, Environmental Policy, Law & Economics, and Interdisciplinary Environmental Studies. Each student will also take 1 credit hour of Ethics, 2 credit hours of Seminar, 6 credit hours of Statistics and 6 credit hours of Internship. 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 required for the MS in Environmental Science beyond the Bachelor of Science Degree. Any additional course work requirements will be determined by the MS Practicum Advisory Committee to meet the student's specific program needs. MS Practicum students are required to take a qualifying examination, complete a final practicum report and publicly defend their completed practicum report. Passing all requirements implies that the student has the necessary knowledge and sufficient critical thinking skills to advance toward completion of the Masters of Science Degree (Non-Thesis) in Environmental Science.

K. CHANGING DEGREE TRACKS

Students who wish to voluntarily change degree tracks from PhD or MS Thesis to MS Practicum may only do so with the full approval of the EVS Program Committee. The student must submit a written request, signed by the chair of their committee, detailing the student's progress and specific reasons for requesting the change. Students who wish to move from MS to PhD may only do so through formal application to the PhD program. PhD students who wish to change to MS Thesis may only do so with the permission of their PhD Advisory Committee. A formal letter of intent including reasons for the change must be submitted to the Program Office.

L. ACADEMIC PERFORMANCE

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

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

Review of the Student's Progress: Each spring the EVS Director reviews the progress of all EVS graduate students. Students who have not made sufficient progress during the past year will be reviewed by the EVS Program Committee who may or recommend strategies to ensure sufficient progress to the Research Advisory, PhD Advisory Committee and student. In extreme cases or in those where insufficient progress is a pattern, the Program Committee may recommend dismissal from the EVS Program. Other than in exceptional circumstances, a decision to recommend dismissal of a student from the EVS 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 EVS Program. The Research Advisor and EVS Program Director will assist students dismissed from the PhD EVS Program in their effort to obtain a suitable 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 Environmental Science and may result in dismissal from the Graduate School.
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 dissertation 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 EVS Program Committee will not be eligible for further program support (although Research Assistantships may still be arranged with individual faculty members).
6. **Failure to successfully defend a Thesis/Practicum/Dissertation**.
7. **Failure to pass the Comprehensive Examination (EVS PhD)**.
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 EVS Program Committee. After review, this committee may, at their discretion, recommend further action, including dismissal from the EVS Program to the EVS 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 Environmental Science. Most EVS 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. EVS Program Office

The EVS Program office is located within the College of Sciences and Mathematics Dean's office suite in LSW 552. From time to time it will be necessary to file various forms requiring the approval of the Director of the Graduate Program in Environmental Science. All of this paperwork should be submitted directly to the EVS Program Office. Forms may be downloaded from the EVS website or obtained from the EVS Program Office.

B. Registration and Tuition

Graduate Assistants: If you are a Graduate Assistant, carefully review this section. If you have questions, contact the Arkansas State University Graduate School (972-3029) or the Graduate Program in Environmental Science (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 EVS Program dollars 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. Contact the Arkansas State University Graduate School with questions about appointments, tuition benefits, or any billing problems associated with the above.

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 Graduate School has not received a final transcript from the student's previous college or university that shows a degree has been received. The Graduate School requires students to register no later than the 11th 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.

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's Name:
Student's ID#:
Course Name:
Course Number:
Number of Credit Hours:
Course Title:

You cannot enroll in these courses without permission from your Research Advisor, so she/he needs to send an email with this information to the EVS, 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.

Note: EVS 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 Office of Research and Technology Transfer staff for assistance with all grant proposal submissions.

C. Continuous Enrollment

The Graduate Program in Environmental Sciences has a continuous enrollment policy. Students must enroll for a minimum of 1 dissertation hour once attaining candidacy each semester to remain in the program (Fall and Spring) and must only register for 1 hour of dissertation credit in the summer sessions if graduating in August or if receiving graduate assistant support. Master's students are required to register for a minimum of 1 hour of thesis or practicum in the Fall and Spring as well as summer session if graduating in August or if receiving graduate assistant support. Continuous enrollment is generally an issue if a student leaves the program prior to defense of the dissertation/thesis or if funded through internal/external sources has been exhausted.

If a student fails to meet the continuous enrollment policy defense/graduation may be significantly delayed.

D. 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.

E. E-Mail Accounts

Student email accounts can be set up by going to the ASU main webpage (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 Student Log In 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 address, so be sure to check it frequently. Emails from the EVS Program Office will NOT be sent to email addresses that are outside the astate domain.

F. Fee Statements

Only doctoral level Graduate Assistants supported by EVS 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 EVS 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.

G. Outside Employment

Graduate Assistants 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. The student must consult with their Research Advisor prior to committing to any outside employment, including work as a private tutor. As long as the student is supported by grant or ASU funds (as a GA, RA or TA), the student cannot accept any other employment within ASU. Outside employment without the prior approval of the Research Advisor and the EVS Program Director may jeopardize the student's position in the EVS program.

H. Space

Upon arrival, first-year students may be assigned office and study space. When a Research Advisor is chosen, office and research space may be re-assigned by the Research Advisor. The EVS Program Office must be notified if the student's office space has been re-assigned. Also, the EVS 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.

I. Keys

Upon arrival, students should ask their Research Advisor to help secure keys to their assigned office space from their host department. 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.

J. 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 ASU campus can be found here: http://www.astate.edu/dotAsset/1127bd90-3304-4b04-a8fd-b74cda747348.pdf. Please inform your Research Advisor and the EVS Program Office once you have chosen a mail drop location so that we can ensure that your campus mail arrives in a timely manner.

K. Support and Teaching

All Program support is arranged by the Director of the Graduate Program in Environmental Science and the Program Committee, and is based in part on information provided by the Graduate School and 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. Summer support for PhD students is available, but is awarded based on availability of funds and student merit. However, if a student receives a 2 or more semesters of support, they are required to teach a minimum of 1 semester while on support. Therefore planning is critical and should be discussed with the student's Research Advisor early in the student's program of study. The maximum teaching load will be 2 laboratory or 1 lecture section(s) per semester. Students who intend to teach a lecture section but have not had significant teaching experience in the past are required to take ESCI 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.

L. Plagiarism

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

ASU's policy on academic integrity is found here:
http://www.astate.edu/a/student-affairs/student-conduct/OSC/standards-of-student-conduct.dot.
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 someone else's ideas or data without acknowledgment. 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 Environmental Science Program will be REQUIRED to complete Responsible Conduct in Research (EVS 7151) during their first year. 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 Environmental Science.

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 EVS Program and what the program expects from our students.

B. Information about Policies and Procedures

The Graduate Program in Environmental Science 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 EVS Program and the Graduate School. Students and alumni also have a responsibility to respond to program inquiries about their career development.

C. Communication about Academic Status

The Graduate Program in Environmental Science is responsible for providing students with information about their individual academic status. Students are responsible for communicating with the Graduate School and the EVS 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://www2.astate.edu/a/research-transfer/patents-licenses.dot

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, Radiation, 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://www2.astate.edu/a/research-transfer/research-compliance.dot#tab_3.

F. University Governance

The Graduate Program in Environmental Science 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 EVS Program, Department, College, Graduate School 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.

G. EVS Program Governance

The Graduate Program in Environmental Science is housed in the College of Sciences and Mathematics. The Dean of that College and the Dean of the Graduate School are ultimately responsible for the administration of the EVS Program. Thus, the signatures of these deans are required on many important forms. The Director of the EVS 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 EVS Program Committee, upon approval by the Dean, is responsible for establishing Program policies and guidelines. Under the direction of the Deans of the College of Sciences and Mathematics and the Graduate School, 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 EVS

Program Committee consists of the EVS Program Director, and Faculty representatives appointed by the Dean of the College of Science and Mathematics.

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 how this employment is tied to their academic progress. The details of specific teaching or research assignments may need to await later written clarification. 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 ASU 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 ASU 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 EVS Program Committee. The request must include a written recommendation from the Research Advisor. After consideration of the request, the EVS Program Committee will make a recommendation to the Research Advisor, the PhD Advisory Committee and the EVS Program Director. Ultimately all such requests must be approved by the Deans of the College of Sciences and Mathematics and the Graduate School.

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://www2.astate.edu/a/registrar/tools-forms/bulletins.dot
Student Handbook: http://studentconduct.astate.edu/studenthandbook.html
"Governing Principles for Safe Laboratory Practice" and a complete list of compliance practices can be found at : http://www2.astate.edu/a/research-transfer/research-compliance.dot#tab_3
Intellectual Property Policy: http://www.asusystem.edu/about/policies.dot
Faculty Handbook: http://academicaffairs.astate.edu/facultyhandbook.htm

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 (http://blackboard.astate.edu/).

K. Grievances

All students enrolled at Arkansas State University are provided free electronic access to the ASU ***Student Handbook and Planner*** at the beginning of each academic year at the following web address: http://studentconduct.astate.edu/studenthandbook.html. This handbook provides complete details of all policies and procedures in effect at ASU. 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.

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 EVS Program, the Chair of the faculty members department, the Dean of the College of Sciences and Mathematics, or Dean of the Graduate School as appropriate to the problem. Issues irresolvable at the Program or College level will be brought to the Dean of the Graduate School.

SECTION IV. Graduate Assistantships

A. Teaching Appointments

Appointments of graduate assistants with classroom or laboratory teaching duties use the official title "Teaching Assistant". 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 Environmental Science in collaboration with the student's Research Advisor and Chair of the Department in which the student will be teaching. If the student has a strong preference for the type of teaching assignment he/she is given, it should be made known to the host Department Chair, the Research Advisor, and the EVS 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 EVS Program Director, Department Chair and EVS 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 about 20 hours per week to a full graduate teaching assistantship or 10 hours per week to a half-time assignment during each semester. This time requirement will probably vary considerably from week to week. Full-time TAs generally teach no more than one lecture course or three to four laboratory sections per semester. Assignments which significantly differ from this estimate should be brought to the attention of the faculty in charge of the course or to the EVS Director. Students who are transitioning from grant support and intend to request EVS support should contact the EVS office immediately to ensure consideration by the EVS Program Committee.

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 the Teaching Supervisor, Instructor of Record and Research Advisor. 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 EVS Director. If the problem remains unresolved, the Director will work with the Department Chair to present the issue to the College Dean for further action. If the issue cannot be solved at the Program or College level, the issue will be brought to the Dean of the Graduate School. 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 EVS Director. If the issue cannot be solved at the Program or Department level the issue will be brought to the Deans of the College of Sciences and Mathematics and Graduate School.

E. Teaching Assistant Mentorship

The Faculty member Instructor of Record for the course in which the TA is assisting agrees to provide significant mentorship to EVS TAs. It is in the interest of EVS 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 research performed under these appointments may be used to satisfy thesis/dissertation requirements. The continuity of a Research Assistantship is subject to the continued availability of funds. The EVS 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. In general, students cannot be paid as Research Assistants unless they are working full time on the ASU campus. 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 EVS Program Office.

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, Travel 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://www2.astate.edu/dotAsset/154017.pdf or in Departmental Offices.

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, EVS Program Office, and Graduate School 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 ASU's travel policies is available at the Office of Procurement and Travel Services website (http://www.astate.edu/a/finance-admin/travel/travel-guidelines/). 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 EVS Program Office at least 14 days in advance of travel to ensure coverage. This form is available at: http://www.astate.edu/dotAsset/260719.pdf. After completion of travel, reimbursement of expenses requires submission of a TR-1 form and applicable receipts (http://www.astate.edu/dotAsset/260721.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 ASU 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
EVS 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 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 the student's attention to University policies on Intellectual Property, Environmental Health and Safety, Scientific Misconduct, the Honor Code, and requiring that policies are 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 the 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 Environmental Science 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 EVS 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.
- If possible, develop grant writing skills by assisting their mentor in proposal preparation, applying for student oriented grants awarded by professional societies and federal and state agencies.

C. The EVS Program's Role

Introduce new graduate students to the policies, practices, and resources of the EVS Program by means of an orientation session;

- Provide students with written documentation of EVS 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 EVS Program Director, the Graduate School Dean, 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 School.
- 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.

D. Suggestions for Good Research Proposals: The first step in solving any problem is to correctly identify the problem and the steps necessary to solve it. Next, the problem must be analyzed as it relates to previous research in the field. The third step is to state how any preliminary results that have been obtained relate to the potential success of the project. The final step is to use the preliminary results to design future experiments, and extrapolate from the future results how the problem will be solved. Therefore, the critical elements faculty expect to see in thesis/dissertation proposals:

1. What work has previously been completed that is relevant to the selected problem?
2. What are the key experiments necessary to answer the question?
3. Why are they the key experiments?

Because each project is unique, it is impossible to specify exactly what should be contained in a proposal. However, there are features common to all proposals. These include:

i. Brief abstract (0.5 - 1 page) - An overview of the goals and importance of the research project
ii. Hypothesis and Specific aims (1 page) - A concise statement of the hypothesis being tested and of the specific aims that will be used to test the hypothesis
iii. Background and significance (3-4 pages) - A brief review of pertinent literature that establishes the significance of the proposed research and provides a context for that research.
iv. Preliminary results (3-5 pages)
v. Research design and methods (3-5 pages)
vi. Cited Literature (pages as needed)

Experimental design, anticipated results, and how these results relate to the goals and objectives should be discussed.

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 EVS 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.

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) 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://www2.astate.edu/a/research-transfer/patents-licenses.dot

Collection and Retention of Research Data:

The Principal Investor (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.

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 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 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 does arise the ASU 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/192315.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 EVS Program, but they should be based on a general understanding between the student, faculty member, their Department Chair, their College Dean, and the EVS 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 EVS 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 EVS 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 EVS 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 EVS 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, the Dean of the Graduate School 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 EVS Program Director will refer cases of significant student misconduct to the Dean of the Graduate School. Cases involving faculty or staff members will be referred to the appropriate administrator (i.e., Department Chair or College Dean).

E. EVS Graduate Student Publication/Presentation Policy

Upon acceptance into the program, all Graduate Students in the Arkansas State University Environmental Science Program automatically agree to abide by the policy that their advisor, with input by their PhD/MS Advisory Committee, the EVS Program Committee and EVS 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 over all 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 participation in any capacity in the Environmental Science

Program. All EVS 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.