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Chapter 1

Departmental Admissions Policy

The Biosystems Engineering Department of Auburn University welcomes applications for graduate study from all persons whether or not you have engineering degree. For those, who do not have undergraduate degree in engineering, they will require to take some engineering foundation courses. We feel our Department is an open and inclusive group and you can, once admitted, feel at home and a part of an exciting and diverse organization. Departmental requirements for gaining admission is the same as those published by the Auburn University Graduate School plus valid GRE scores. In order for the committee to review your application, you need to formally apply to the Graduate School. You should include the following materials with your application submission.

- Letters of recommendation from three persons familiar with your qualifications for success in pursuit of a graduate degree.
- CV (maximum of 2 pages)
- A letter (Research Interest or Problem Statement) stating:
  1. Your career goals after graduate school,
  2. Your research interest, specifically, what topics within the broad research areas in Biosystems Engineering you consider of most interest to you, and
  3. A list of your unique skills and abilities that might make you suitable for graduate studies in Biosystems Engineering.

Once all your applications materials have been received, they are forwarded to the Biosystems Engineering Departmental Graduate Admissions Committee for review. The Committee makes an assessment of each applicant’s qualifications and makes a recommendation to the Graduate School as to whether or not the applicant is acceptable for admission.

At this point, the applicant may, or may not, be offered admission. It is the policy of the department to not admit students into MS (thesis option) and PhD programs (see next paragraph for students in the MS non-thesis option) if they do not have funding support from a faculty member. The funding support must be sufficient to support their stipend and research expenses. Applicants are therefore encouraged to contact individual faculty members about the potential for funded research in which they might be interested. Applicants should initiate a conversation with faculty members whose research interests line up with their own, typically through an exchange of email. Applicants are
encouraged to contact faculty members before even applying for the Graduate School to save resources (time and money). Students interested in the MS (non-thesis option) can be admitted without securing funding support from a faculty member. However, the student will be responsible for demonstrating that he/she has the financial support during the graduate program.

If the applicant can be supported and has been deemed qualified, they will be offered admission. The offer will come in the form of a letter from the Graduate School and will state the level of support anticipated. If the applicant decide to attend Auburn University, he/she can request the offer letter from the Department. The offer letter could be helpful for Visa process for an international student but it is required by the Office of Human Resources to complete all the paperwork for the payroll.

1.1 Admission Standards

The Biosystems Engineering Department has not formally defined minimum standards higher than those of Auburn University Graduate School as qualifications for admission. Each case is evaluated strictly on the merits of the person and their suitability for the work anticipated. This is not to say, however, that admission is recommended for applicant. Expectations of the faculty are that students admitted into the graduate program will be among the most highly qualified coming from their undergraduate institution. Typically, accepted applicants will have GPAs higher than 3.0, GRE scores exceeding 300, and be able to communicate effectively in English without remedial instruction.

1.1.1 Admission for Students Without Undergraduate Engineering Degrees

Students without an undergraduate engineering degree may be admitted. However, these students should have, at a minimum, a science degree from a respected institution. Admitted students will be required to take a selection of fundamental undergraduate engineering courses deemed by the faculty as essential background for engineers.

These fundamental Engineering courses will help ensure that the students have the academic and technical background to complete graduate level engineering courses and graduate level engineering research. The students are required to (a) complete the Foundation Engineering courses within one year from the start of their graduate study and (b) maintain a minimum cumulative GPA of 2.75/4.0 in these courses. These Foundation Engineering courses are not required for the students who have already taken these courses and have met the minimum cumulative GPA requirement.

Suggested Foundation Engineering Courses:

- **MATH 2630**  Calculus III
- **MATH 2650**  Differential Equations
- **ENGR 2010**  Thermodynamics
- **ENGR 2050**  Engineering Mechanics – Statics or equivalent (or a combined course in Statics, Dynamics, and Mechanics of Materials [ENGR 2100])
- **BSEN 3310**  Hydraulic Transport in Biological systems [or combined

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1 The choice of these courses is based on the research focus of the individual student.
Admission Conditions:

- Students who do not have a previous engineering degree will be admitted on a conditional basis and their continued status will depend on successful performance in the Foundation Engineering courses.
- Students who are admitted conditionally will have the opportunity for research or teaching assistantships like any other students.
- Students need to complete all the foundational courses prior to submitting Plan of Study for approval.

The Graduate Admissions Committee has defined a set of skills deemed necessary for all engineering students and these are reflected in a list of courses a student might have to take. It is up to the student’s committee to ensure all requisite skills have been acquired by requiring that students take appropriate courses needed to acquire these skills. It is up to the faculty advisor whether or not the student will be compensated for time spent in making up these remedial skills.

1.1.2 Admission for Students With Undergraduate Engineering Degrees in Other Disciplines

Persons with undergraduate degrees not in Biosystems Engineering may be admitted into the program. The student’s committee, however, may require additional coursework for the student to gain an understanding of the unique nature of the Biosystems Engineering discipline and an appreciation of the challenges faced with applying engineering principles to biological and ecological systems.

1.1.3 Direct from BS to PhD

Students interested in pursuing a PhD in Biosystems Engineering directly after completing their BS can be admitted. The Graduate Admissions Committee may, however, apply a higher admission standard when evaluating such students as they have chosen a difficult career path perhaps without having demonstrated an aptitude for research.

1.1.4 Students Having Outside Funding

There have been situations in which students were admitted to Auburn University without receiving the majority of their funding from a faculty member in the Department. Those students have typically brought funding from their own government or institution. Persons receiving such support are normally established as being highly qualified through their selection for that funding and they are encouraged to apply.
Chapter 2
When You Arrive

On behalf of the faculty and staff of the Biosystems Engineering Department, welcome to Auburn University. This handbook is intended to help you understand the Departmental and Graduate School requirements for your degree, and also to impart a bit of wisdom regarding how to make the most of your time here. Graduate school is an exciting opportunity that can open many doors in your future. It is not, however, simply ‘continuing your education’ - it is training for a very specific career path, one that requires a great deal of commitment and effort on your part. Even if you are not planning on an academic career, it is best you understand that is the assumption made by the faculty in guiding you while at Auburn. Persons wishing to work in academia are subject to very rigorous standards of excellence in research and teaching and your advisor’s role in your education is to ensure that you graduate with the skills required to be successful.

2.1 Getting to the Tom E. Corley Building

Those of you not having attended Auburn previously will have, hopefully, successfully navigated your way to town and had a chance to settle into a domicile. Congratulations, Auburn is a nice, relatively small, and friendly place and you should find it simple enough to get around. Your next challenge will be to navigate your way to campus - a much less friendly place when it comes to driving (really just parking). Please be aware that, like at most universities, you will cause yourself no end of grief if you try to park somewhere on campus without the requisite pass, so best not to try.

If you do happen to have a vehicle, see this web page for procedures to register for parking. In general, graduate students are treated as regular students and do not receive any additional parking privileges. If you don’t have a vehicle, the transit system is available for getting to campus from home, although it may be a hike to get to the nearest transit stop. Some apartment complexes also offer their own shuttle service to campus. Bikes are a good option and Auburn is small enough that one can get just about anywhere quickly on one. Auburn requires bicycles to be registered (go to Parking Services).

So assuming you can get there, the Tom E. Corley Building is located at 315 Mell Street. You can visit this webpage to locate Corley building.
2.2 What to Do When You First Arrive

Your first mission should be to introduce yourself to Ms. Amber Denham, the department’s Administrative person for academic and human resource issues. She can assist you in filling out the numerous forms you will need to complete and knowing her will, in general, ease your entry into the graduate school world. Your next stop will be to visit with your advisor.

Arrival for international students can be a bewildering experience. International students must report to the Office of International Program (228 Foy Hall) as soon as they arrive on campus. It is best to talk to Ms. Denham or other graduate students for assistance in getting oriented, or contact the Office of International Programs. There is also typically a mandatory orientation session for international grad students conducted prior to the start of each semester. Check the Office of International Program web page for the orientation schedule.

If you have an assistantship, or otherwise plan on working during your time at Auburn, you will require a Social Security number. If you are not a citizen you will have to acquire one. There is a mandatory 10-day waiting period from the time you enter the United States before you are eligible to apply. Any time after that, you must go to the Social Security Administration office in Auburn to register. The Office of International Program will assist you in the process if you attend their orientation session for international students. You can Ms. Denham for your job offer letter, which is required to apply your Social Security number.

2.2.1 Health Insurance

All graduate students are required to have health insurance coverage. If you do not have personal coverage, it can be obtained through the University - see this web page for details. You are automatically enrolled in the health insurance program unless you officially decline it before the deadline mentioned in the website. To do that you must fill out this form and email it to the student insurance office before the deadline. Students who enroll in the Auburn University Graduate Student Group Health Plan (GSGHP) will use the Auburn University Clinic as their primary care facility and students are encouraged to take advantage of the services provided to maintain their physical and mental health. Additional benefits are provided through the GSGHP and may include discounts on annual eye exams, dental checkups and routine dental treatments. Students should find preferred providers who accept the United Health Care Student Insurance.

2.2.2 Offices

Offices are assigned to students receiving assistantships. Consult with Ms. Denham for your assigned office space. You will likely be sharing your office space with multiple people so please be considerate with regards to the use of the office space. Keep distractions to a minimum and keep your space and
immediate surroundings as clean, and as presentable as possible. Cooking in offices is not allowed by the University but it is fine to eat lunch at your desk. Be aware, however, that your eating habits may be quite different from your office mates and perhaps plan your meals accordingly. Be especially considerate of your office mates in matters of personal hygiene.

2.2.3  Keys

Keys to the building and your office are controlled through the Access Control Office in Auburn University Facilities Division. After the Department Head authorizes keys to be issued, Ms. Denham transmits key requests to Access Control. It generally takes a few days for keys to be prepared. You will then have to go to the Access Control Office to sign for them. Note that you are responsible for all keys assigned to you and these must be turned in before you graduate. The Department is financially liable for re-keying locks if any keys are lost, so please guard your keys carefully.

2.2.4  EMail

Email accounts should be set up through the Office of Information Technology located at 300 Lem Morrison Drive. The process involves filling out a form with information such as your student number, what department you are in, and a few other things. You are also required to show proof of your enrollment or employment - call them (844-4944) about what sort of documentation is considered proof, or perhaps see Bobby Epling for advice on this. Turnaround time for creating an account is about one day.

2.2.5  Pictures for Departmental Website

Graduate students are listed in the departmental website so please contact Ms. Joy Brown to have your picture taken. Ms. Brown usually contacts new students for picture so please respond to her email when you receive it.
Chapter 3

Responsibilities as a Student

Most of the following can be found in the Graduate School Handbook available for download from the graduate school web page, or you can use an interactive version at this location. If you have other questions about academic issues, the first point of contact will be your advisor. The second should be the Graduate Program Coordinator for the Department, Dr. Adhikari.

All of the student responsibilities you will be required to fulfill can be summarized as relating to making satisfactory progress toward completing the degree, a standard that is ultimately established and evaluated by your committee. The standard of progress established by your committee will be enforced by your advisor.

3.1.1  What Classes You Can Take

You will take the courses required by your committee on your Plan of Study, which will be developed to fulfill the requirements of both the Biosystems Engineering Department and the Graduate School for your degree. You can, in general, take any course offered at Auburn University and it will show up on your transcript. In practice, however, your advisor (and committee) will frown on taking courses outside those on your plan of study that do not materially enhance your ability to conduct research. You are a student at a university and there are courses available, outside of those that you are required to take, that might help you in the future, but these courses may absorb some of your limited time - be prudent.

You will not receive graduate credit for 4000-level (or lower) courses even though your committee might require you to take these courses to correct a deficiency in your undergraduate training. In addition, grades from 4000-level (and below) courses can be used in calculating your cumulative graduate GPA (CGGPA). Any course not on your Plan of Study can be taken on a pass/fail (S/U) basis, or audited, but taking these types of classes has to be approved by the Graduate School and your committee. There is a form for this (see this web page for this, and many other, forms).

3.1.2  Credit Hour Requirements

Students in the thesis option MS program are required to earn 30 semester hours in graduate level courses, of which 16 credit hours are required to be in Engineering courses (not including Research and Thesis). 10 out of 16 credit hours must be in Biosystems Engineering courses. Of the 30, a minimum of 6 must be in a ‘Research and Thesis’ course (for our department, that is BSEN 7990), but no more than 6 hours can be credited.

Students in the non-thesis MS are required to earn 30 semester hours in graduate level courses, of which 19 credit hours are required to be in Engineering courses. Of the 19, a minimum of 13 credit hours must be in
Biosystems Engineering courses including 1 credit seminar class (BSEN 7950).

Requirements for the PhD are a little more complicated. The minimum standard is 60 hours of graduate-level course work beyond the bachelor’s degree. Your advisor and committee will assist you in meeting this requirement but the ultimate responsibility for meeting this requirement is on you.

A minimum of 33 graded course credit hours at the 6000-level and beyond is necessary, any portion of which may have been earned while pursuing the MS degree. The remaining 27 hours can include ungraded courses, including up to 4 hours of 7990 (Research and Thesis) from the MS program and must include no less than 10 hours of 8990 (Research and Dissertation). There is no maximum number of transfer hours that can be credited, but no less than 18 hours must be earned while enrolled at Auburn University.

The BSEEN Department imposes a few additional course requirements that conform to the general graduate school rules. These are summarized in Section 3.3.1 Plan of Study.

The graduate school requires a ‘majority of course work’ listed on the plan of study must be completed at AU. More details of the credit hour requirements for biosystems engineering graduate students can be found in AU Bulletin.

3.1.3 Grades

To receive a graduate degree, a candidate must maintain a CGGPA of 3.0 out of 4.0 in all graduate-level courses (those 5000-level and beyond). This means any graduate-level course you elect to take will also be used in calculating your CGGPA, up to a maximum of 9 hours beyond what is on the Plan of Study. The only exception to this rule is a course retaken to fulfill the minimum grade requirement for a class that is on the Plan of Study. The minimum grade allowed in any course taken for graduate credit is C. Graduate-level classes for which a grade below C is earned must be repeated until the minimum standard is fulfilled.

If your CGGPA falls below 3.0, you will be placed on academic probation. Your CGGPA must be brought above a 3.0 within the next 11 hours of graduate course work taken (or two full terms excluding summer sessions, whichever is sooner), or you will be placed on academic suspension and must withdraw from the Graduate School. Courses re-taken do not count against the 11-hour limit. If you must withdraw, you must create a ’remediation plan’ that is approved by your committee and the Graduate School, complete the plan satisfactorily within two school terms, then reapply for admission.

It is the policy of the Biosystems Engineering Department that students on assistantship are allowed to retain their financial support for one semester of academic probation, although this is not a requirement - the assistantship can be terminated at anytime by the Department Head in consultation with a major advisor. If the probation persists beyond one semester, the assistantship will be revoked. It will be left up to the Department Head and the student’s advisor whether or not the support can be reinstated at some later time. Under no circumstances will the student be reimbursed for back pay once the assistantship has been revoked and reinstated.

Incompletes are a nightmare and should be avoided at all cost. If you receive an incomplete in a course you have one full semester’s time to rectify the situation or be given a grade of F. An incomplete in a course even
not on the Plan of Study will prevent you from graduating - make sure the problem is fixed quickly.

3.1.4 Transfer Credits

You can transfer a maximum of 6 graduate semester hours for a MS program from another institution. Your committee must approve the relevance of the courses to your plan of study. You must have earned at least a B in the courses and have taken them within the last 5 years. No transfer credit can be used to repair a CGGPA below 3.0 and avoid academic probation. There is no maximum on the number of transfer credits for a PhD, but at least 18 course hours must have been earned at Auburn University. A maximum of 30 hours earned for an MS degree may be counted toward the PhD.

3.2 Tuition Fellowships

Current policy of Auburn University is to provide in-state tuition fellowships for most graduate students with a research or teaching assistantship meeting the following requirements:

• Minimum appointment of 0.33 FTE (full time equivalent), or working at least 13.2 hours per week.
• Receiving financial support for the entire semester.
• Support exceeds a level set by the Provost — check this web page for the minimum qualifying amount.
• The person is in a degree program, is in good academic standing (CGGPA >3.0), and is registered for between 1 and 15 semester hours of course work, including during Summer term.

Note that you will lose your tuition fellowship if your CGGPA falls below 3.0.

The fellowship, however, does NOT pay for distance education courses or any of their related fees. The Graduate Assistant Enrollment fee is $597 per semester for the 2017-18 academic year.

Graduate assistants who have received a 0.33 FTE or higher assistantship for two semesters of a given academic year and are not on assistantship for the third semester will receive tuition support during that corresponding third semester.

3.3 Committee

Technically speaking, you have absolutely no control over the membership of your advisory committee - the appointment is purely at the discretion of the department head. In practice, however, you have some influence on the committee makeup and you should be careful about who is included. Work closely with your advisor in selecting potential committee members, then speak with them individually about their expectations and their views on the research project you will be performing. Ask for their recommendations on what courses should be included in the Plan of Study. With great discretion, make sure there are no personal conflicts between potential committee members.
A MS graduate committee is composed of at least three members. For the MS degree at least two must be members of the Graduate Faculty and the committee chair must be a Graduate Faculty member in the program awarding the degree. A list of Graduate Faculty members can be found here. For the PhD, the University requires a minimum of four committee members and the committee chair (or co-chair) must be Graduate Faculty in the program granting the degree. The committee must have at least two Graduate Faculty members, and at least two appointed at Level II. There is a general sentiment among faculty that at least one member of the committee be from outside the Biosystems Engineering Department, but it isn’t required. If you have a committee member that is not affiliated with Auburn University, you can have only one and that person must hold a terminal degree in the field. The Department requires at least two of the committee be members of BSEN faculty.

Once you have identified a workable group of committee members, it is up to you, in consultation with your advisor, to keep them fully informed of the progress being made in the degree program. This can be done through regular meetings, through submission of reports, or however you and the committee decide, but it must be done. It is important to remember that retention of any graduate fellowship or stipend is contingent upon your performance, which is chiefly evaluated as ‘making satisfactory progress toward completing the degree’. Evaluating this rather vague standard is done entirely by your advisor and your committee, so keeping them up to date with your efforts and successes is crucial.

### 3.3.1 Plan of Study

The BSEN Department requires that every full-time MS student must file a Plan of Study by the end of the first semester of graduate coursework at Auburn University. The Plan is filed online using Degreeworks and instructions are provided in the webpage. The MS student is required to take the seminar course (BSEN 7950) at least once and present at least one seminar. The Plan of Study must also include at least one course in Math or Statistics beyond the bachelor’s level (6000 or above) and at least three courses taught in the BSEN Department (other than BSEN 7950) must be taken. BSEN 6250 is required for all the graduate students in Biosystems Engineering.

The Graduate School requires a PhD candidate to file a Plan of Study ‘as soon as is feasible’, but the BSEN Department further requires it be before the end of the second semester of enrollment. The Plan of Study must include at least one course in Math or Statistics, and all PhD candidates are required to have taken at least 2 courses in Math or Statistics beyond the bachelor’s level by the time they finish their degree. The Plan must also include at least three courses (9 credit hours) taught in the BSEN Department other than BSEN 7950 beyond the bachelor’s level. It is deemed by the faculty to be important for students in a PhD program to be familiar with the many diverse aspects of their profession, so taking additional courses in BSEN is strongly encouraged.

As noted above, seminar class is considered to be of great benefit to graduate students. **Attendance at all departmental seminars is strongly encouraged, regardless of whether or not the student is enrolled in BSEN 7950.** PhD students are required to present twice in seminar class during their tenure in Biosystems Engineering. **Biosystems Engineering Graduate Programs Course Work Requirement** is listed below.
### 3.4 Thesis & Dissertation

A graduate student is required to complete prior to graduation a thesis (or dissertation for PhD) detailing research efforts conducted in conjunction with the degree program. The research topic is agreed upon with the advisor and committee, normally in the form of a research proposal submitted by the student for approval. This document will list the objectives of the research, suggest likely methods and procedures to be
used, and describe outcomes and deliverables the committee wishes to see result from the work. A formal research proposal is a requirement of the BSEN Department for PhD students, but writing one, and having it reviewed by and agreed upon by your committee, is highly desirable for MS students as well and will significantly improve your chances of graduating on time and without excessive headaches.

The graduate thesis is intended to be a complete record of your specific project. It should, therefore, include all relevant data gathered, equipment used or developed for the study, and procedural details employed in the work. The MS degree is intended to prepare you for a career in research and the thesis, therefore, should also be a record of your ability to formulate and interpret the results of an experiment in order to answer a new or unique question. The thesis should, at a minimum, define the research problem, establish the context within which the problem is being solved, and provide a narrative describing how the results achieved answered the questions posed.

Students that are enrolled in non-thesis MS do not require to submit thesis or project report. This degree is solely based on course work.

### 3.4.1 Thesis Preparation

The Graduate School publishes the *Electronic Thesis and Dissertation Guide* to assist you in preparation of graduate theses. There are numerous formatting requirements, but templates are available for use in setting up the document to minimize undue strife. Formatting and referencing a multi chapter document can be quite difficult, therefore students should begin writing with the end in mind and select an appropriate formatting and reference software at the start of their program.

Be very careful in preparing your thesis to fully annotate any information you borrow from other sources. There is a link on the above Graduate School thesis web page that fully discusses copyright issues in research and you should read it.

It is not a requirement of the Department, but is strongly encouraged, that graduate students write and present a paper covering the thesis topic at an annual meeting of a professional society. This will typically be at an ASABE event, either the international meeting or a state section, but other societies will do. For the ASABE international meeting this will always be in summer and a student should schedule their work with the understanding that a paper will need to be completed sometime in the preceding early spring in order to be published in the conference proceedings. A paper proposal will typically be due in late fall of the preceding year.

### 3.4.2 Formatting Bibliographies

The ASABE says it conforms to the *Chicago Manual of Style* (CMOS) in all its publications, although this is debatable. The BSEN Department, therefore, asks that, in questions of formatting not explicitly regulated by the Graduate School, MS theses be prepared in accordance with CMOS. This is especially true of bibliographic citations.
The CMOS can be found online, but parts of it are available only by subscription - probably the ones you need. The Draughon Library has a hard copy of the manual (located at Z 253.C57 in the stacks). The ASABE web site also has a fairly complete set of Instructions to Authors that can be consulted. When in doubt about formatting, check with your advisor.

Formatting bibliographies can be a real pain, but there are software tools that ease the process. One of particular utility is End-Note, which is a bibliographic database that can import and export citation lists in just about any format. The software can be purchased through Auburn University College of Agriculture IT Department at a very reasonable cost - ask your advisor about it.

3.5 MS Defense

The culmination of your work as a MS student will be defending the work you have done for your thesis project in front of your committee, your peers, and the faculty. This will typically involve giving a seminar that has been announced in department, fielding questions from the audience, and finally a question-and-answer session with just your committee in attendance. This is when all that work informing your committee members about your progress along the way will pay off.

The purpose of the defense is to allow your committee one more chance to evaluate how well you have done in meeting their expectations for how you formulated and executed the research experiments associated with your degree program. It is also a time to put you on the spot, forcing you to answer what might be very tough questions about decisions you have made along the way, how you have interpreted the data, or how you might reinforce the conclusions you have drawn from the research. In short, the committee is trying to assess what kind of researcher you have become. It is not (at least typically) an intentional hammering away at you until you break down into a blubbery pile of goo, although that can happen. Your committee just wants to see that you have prepared, you know your work, and you can think on your feet.

There are numerous deadlines associated with the submission of theses and taking of final exams in order to graduate in any given semester. The Graduate School publishes a calendar that lists all these deadlines by semester. The first requirement is that you must file a request for a graduation check the semester before you are to graduate—no exceptions. Given that has been filed, your thesis format check (optional for MS student) has to be done sometime very early in the semester you are to graduate. The last day to turn in all signed paperwork, including the final thesis, and signed exam forms is usually about 2 weeks before the end of the semester but please check the Graduate School calendar during the semester you are planning to graduate. Once that’s done, you can graduate.

There are other considerations when scheduling your defense, particularly courtesy to your committee. They will be busy people and would appreciate as much lead time as possible to review your thesis prior to the defense. Work closely with your advisor to ensure that enough time is given, but in general your thesis draft should be in the committee’s hands at least two weeks before your defense date.

3.6 Doctoral Qualifying Exam

This is a required general examination for all students pursuing a doctoral degree. The examination is used to assess the overall knowledge of a student in the chosen field of study. The graduate school requires both
written and oral exams be given, but the contents and extent of them are entirely up to the student's committee. There are no requirements for scheduling the written portion of the exam, but a notice of the oral exam must be filed with the Graduate School at least one week prior.

Although the exam is used principally to ascertain the level of knowledge of the student in a specific field of study, it may also include a review of proposed research methods. As such, a formal Research Proposal should have been completed and approved by the committee prior to scheduling the exam.

A student must successfully pass all written exams prior to taking the oral portion. The full committee must unanimously agree to pass the student following the oral exam. If the committee fails to reach a consensus, the student must obtain the consent of the committee and the Dean of the Graduate School to take it again. It is a rare occurrence for the exam to be taken more than twice but this means that students must adequately prepare for the examination.

3.7 Doctoral Dissertation and Final Exam

It is a Graduate School requirement that there be at least one intervening semester between the qualifying and final exams. For example, taking the qualifying exam in the fall means that the final exam can occur no sooner than the next summer. In order to schedule the final exam, a draft of the dissertation must have been submitted to and approved by the committee. It must then be submitted to the Graduate School who will perform a format check and also appoint an outside reader. It is the job of the outside reader to represent the interests of the Graduate Faculty and the Graduate School. That person will read the dissertation and make a judgement about the quality and completeness of the work. If judged satisfactory, the reader will approve and the PhD candidate can then schedule the final exam.

The final exam is given by the committee, the outside reader, and any member of the Graduate Faculty that cares to attend. A final vote on passing is made by the committee and outside reader and must be unanimous for the degree to be awarded. If the exam is not passed, the candidate must receive the blessing of both the committee and the Dean of the Graduate School to take it again. Taking the exam more than twice is exceedingly rare.
Chapter 4
Responsibilities as a Researcher

The most important, and likely time consuming, part of your training in a graduate degree program will be to formulate, plan, execute, and document an experiment - in other words, to do research. Your project will be formulated with the help, and approval, of your graduate committee, but the ultimate responsibility is yours to make the research happen. Fortunately for you, there are lots of resources available to assist in accomplishing that task.

4.1 Graduate Research Assistantships (GRA)
It is very likely as a graduate student that your advisor will have secured some type of funding with which your project will be supported. Part of this funding may be cover your salary as a GRA, making you a temporary employee of the University and, as such, you will be required to work a certain number of hours per week, just like in any job. What you do in those hours will be between you and your supervisor - most likely your advisor. Remember that you will be evaluated on your performance in this job and that retaining your assistantship position will be contingent upon successfully completing your assignments from the supervisor.

Graduate Research Assistants (subject to conditions) may receive an automatic tuition waiver from the University, as discussed previously. The tuition waiver is a privilege awarded to graduate assistants and is in no way automatically granted to students in general. Losing your assistantship not only means loss of salary, but also will mean enrollment in any subsequent course work will require you to pay tuition.

As employees of the University, you are subject to all legal constraints imposed by Federal or State law regarding employment. Most of these laws and regulations have to do with non-citizens. If you hold an F1 visa, your appointment can be for no higher than half time (20 hours per week). Those holding F2 visas are not allowed to work at all. Check with the Office of International Programs if you have questions.

4.2 Research Facilities
There are numerous types of equipment and lab facilities with which you can perform your research. Most of the lab equipment has been purchased by individual faculty members for use in their research programs, but they are typically willing to share if it is well taken care of and any users have been fully trained in its operation, and also if consumable supplies are replaced. It doesn’t hurt to have the
faculty member controlling the equipment on your committee and to include their names on any publications you generate.

Please check with your advisor if you need to use certain equipment. He/she should guide you. You can find a list of equipment available at the Alabama Agriculture Experiment Station (AAES) webpage.

4.2.1 Computer Room/Software

The computer room is located in Room 314 and houses 27 machines. These machines are all hosted on the College of Engineering network and, as such, are subject to all the constraints on their use imposed by the University, as well as a few more. The computers can run all the software licensed by the College of Engineering (see here for details), although it may not be loaded on a specific machine by default. You must have a user ID from the University to log in, and have synced your password in order to use all network facilities that the CoE provides. These include printing services, software services, and user disk space that will show up as the ‘H:’ drive (under Windows) at whatever computer you choose to log in. There are also departmental common disk space facilities (the ‘G:’ drive) that can be used for file sharing, and a drive associated with a URL for your personal web page (I think it will show up as the ‘W:’ drive).

You may be provided a University-owned computer for use while a grad student at Auburn. These computers may be set up similarly to those in the Computer Lab. It is possible to be put on a less restrictive subnet of the College backbone and you will have much greater freedom to administer the computer yourself (add/delete software, for example), although you will lose direct access to many of the College computing resources.

Most computers on campus run the Windows OS, but you may also choose to run Linux (there are a couple of Linux boxes in the Instrumentation Lab), or MacOS. You are allowed to use your own computer as well, but it will be restricted to an untrusted subnet of the University network and will not have access to University-provided resources, such as network drives or printers.

4.2.2 Field Work

Many research projects in the BSEN Department will involve field data collection. The Department has numerous types of equipment for performing the field work, but does not directly control any land on which to perform it. The University operates several research centers located throughout the state that can be used for developing field studies. These sorts of experiments (involving land and resources) have to be planned well in advance in order to get them implemented, so working closely with your advisor and the appropriate Experiment Station personnel is crucial to their success.

In many cases, the land required to perform a study will be that of a private partner. There are perhaps fewer impediments to getting the research started when working with a private landowner, but proper communication and respect for their wishes is still crucial for success. Make sure to close gates, avoid
rutting up roads, not disturb visual or historical features, or degrade in any way the landowners perceived value of their property.

The Department maintains an inventory of quite a wide array of equipment for performing field work. The John Deere 6420 tractor is available for studies and has quite a collection of GPS and precision agriculture equipment installed - see Dr. McDonald. Many field studies in the BSEN Department involve water sampling and collection and there are several ISCO-type samplers available, as well as flumes and Doppler-type flow measurement devices. There are also numerous styles of rain gauges available. Consult with Dr. Dougherty about such equipment.

4.2.3 Campus-wide Facilities

Library
Completing your thesis will undoubtedly involve writing a review of the pertinent literature. The RB Draughon Library is a tremendous resource for this task and you should become immediately familiar with what it has to offer. There are, basically, databases and journals. The databases are used to find articles in the journals, which are either in paper or electronic form. The most commonly used databases are somewhat related to the topic area of your research, but for Engineering in general, the Engineering Village database seems to work well, and for things more agriculture- or forestry-related, the USDA’s Agricola database is pretty extensive.

The library also teaches quite a few classes on use of their facilities - see this web page for a list of what they cover. They also teach classes on use of EndNote software.

Chemical Supply
There is a small chemical supply store located in the Science Education Center building at which you can purchase some of the more common lab supplies you might need, including glassware.
Chapter 5

Departmental Procedures and Policies

5.1 Safety

Safety is of utmost importance in all work sponsored by Auburn University. You as an employee are obliged to ensure all assigned tasks are safely performed. The University in general, and your advisor specifically, are obligated to verify you understand the safety risks inherent in any assigned task, they must take steps to minimize any risks to the extent possible, and they should see you have the proper training and protective equipment available to perform any duties associated with your research.

There are a few general safety observations that can be made.

- One of the activities you can do while at Auburn with the greatest safety concerns is driving a vehicle. No student or employee is allowed to operate a university vehicle unless:
  1. they have a valid drivers license in one of the 50 states in the U.S., and
  2. they have completed the required defensive driving course offered by the university. See Ms. Amber Denham to register for the course.

Driving university vehicles is a privilege and a great responsibility and the department may revoke a graduate student's ability to drive a university vehicle if they cannot operate the vehicles safely.

- For students performing field research there may be times when operating an all-terrain vehicle or agricultural, forest, or construction equipment is required. Training in proper operation of the equipment must be completed before the student uses the equipment. Your advisor must approve of your training before you will be allowed to operate the equipment.

- Being under the influence of illegal drugs or alcohol while performing work will not be tolerated. Other prescription or over-the-counter drugs can also significantly degrade your ability to react and think critically and students should be extremely wary of operating equipment or working in the lab when using them. Any graduate student involved in a vehicular accident will be required to undergo drug testing after the accident in accordance with university policy.

- Working around chemicals requires specific training. This webpage covers general lab safety procedures and should be reviewed carefully. There are online general lab safety training courses available here and your advisor will most likely require you complete at least one.

- Material Safety Data Sheets (MSDS) are supplied for each and every chemical stored in all
laboratories on campus and should be carefully reviewed before chemicals are used. This will inform students of the proper handling and personal protection equipment needed to use chemicals safely.

- Graduate students and/or undergraduate students working with them should never work in a hazardous environment alone. BSEN department policy is that no graduate or undergraduate students are allowed to work alone when conducting field research or working in fabrication shops. Your individual faculty advisor may place additional restrictions on specific laboratories or laboratory activities that cannot occur if you are working alone.

- Proper training is required before operating any specialized machine or tool. Additional discussion is provided in the section on the fabrication and electronics shops.

- Always use required personal protective equipment, especially when working around moving machinery or with potentially hazardous chemicals. If protective equipment is not available, inform your advisor immediately and discontinue work until it is.

- If you observe an unsafe condition, or are asked to work in conditions you feel may be unsafe, stop what you are doing and immediately report it to your advisor or the Department Head. No student will be punished for reporting unsafe working conditions.

- Safety of students in and around university offices or field research locations requires additional diligence to protect yourself from any possible criminal behavior. When working in office spaces outside of normal working hours be sure and keep all office or vehicle doors locked and be extremely careful when traveling to and from your office or work area.

- Before beginning work in any field location or in your office or lab, make sure you know how to direct emergency personnel to that field location or to your office or lab. Our main offices are in the Tom Corley Building, which is located at 315 Mell Street, on the Auburn University campus.

- Make sure you have a functional cell phone with you at all times and maintain a list of emergency contact numbers for your advisor, fellow graduate students, and the Department Head.

  Emergency Contact Numbers:
  
  All Emergencies: 911
  Dr. Fasina: 334 844 3574 (Office)
  Ms. Amber Denham: 334 844 3537 (Office)
5.2 General Facilities

5.2.1 Fabrication Shop

The department fabrication shop exists to help fabricate items needed for research projects (where the items are not commercially available). The fabrication shop is generally not considered space for performing research and there are restrictions on who is allowed to work in this space.

If a custom fabricated item or apparatus is needed for specific research (or repair of an existing item), the graduate student should in conjunction with their advisor, develop the design specifications for the item. The department's engineering technicians or research engineers are available for consultation and frequently offers advice on design features.

In some cases, it may be possible for the graduate student to perform some or all of the fabrication work, depending on the skill level of the student. The ability to work in the shop is a privilege for students and is predicated on the completion of required safety courses, any necessary training courses for specific tools, and approval by engineering technicians/research engineers, and approval by the Department Head, Dr. Fasina. There are some restricted tools and areas in the shop where no students are allowed to work.

Safety of students, staff, and faculty is the greatest concern for any activity undertaken in the fabrication shop. Safe operating procedures include conforming to all posted safety rules, use the necessary personal protective equipment, and never work alone. Violation of any safety rules can result in temporary or permanent suspension of shop use privileges for the student.

Never use a machine or tool with which you are unfamiliar. Always ask for training (and you are required to be trained) before you use the specific general use machines so that you understand its limitations and will not interfere with other shop work. You are responsible for maintaining a clean workspace when performing construction in the shop. This includes housekeeping as well as replacing tools in their proper place when finished using them. It is the Shop policy that leaving tools out or leaving a mess in a given work space overnight is unacceptable. Some clutter in any construction project is unavoidable, but messes tend to get out of control and become safety hazards very quickly. Please stay on top of your housekeeping.

5.2.2 Electronics Shop

The departmental electronics shop is available to assist with development of computing resources, sensors, and data acquisition equipment needed for research. The electronics shop is generally not considered space for performing research, and there are restrictions on who is allowed to work in this space.

If a custom fabricated item or apparatus is needed for specific research (or repair of an existing item), the graduate student should in conjunction with their advisor, develop the specifications for the item. The department's electronics technician, Mr. Bobby Epling, is available for consultation and frequently offers advice on fabrication, diagnosis, or repair. Please send an email to Mr. Epling about the work and accounts.
where expenses can be charged, and a requested completion date.

In general, students are not allowed to work in the electronics shop. If a special need exists where the student may need to work in the shop, they must seek approval from Mr. Epling and Dr. Fasina.

5.2.3 Conference Room

The Departmental conference room is available for committee meetings or your thesis defense. Use of the room is scheduled by putting your name on the calendar. Ms. Denham can assist you with scheduling the conference room for your needs. Please ensure that your meeting does not disrupt those working in offices around you by closing the door.

5.2.4 Coffee Maker, Microwave, and Refrigerator

The department has Keurig Coffee maker for those who likes drinking coffee. You need to bring your own k-cups for coffee. You can use refrigerator to store foods and microwave for heating. It is up to you to keep the coffee (including microwave and freezer) area clean.

5.2.5 Copying/Printing/Phones

It also costs money to use telecommunication and copying equipment - just not your money. It is up to you to use these resources wisely. All copying and phone costs come out of the Departmental budget which, contrary to popular belief, is a finite (and historically rather small) resource.

There are no limits on the number of copies that can be made or pages printed, but that number is also known to certain influential people that might ask your advisor to perhaps say something to a student making liberal use of the privilege. Your advisor will not be happy about performing this task, so exercise restraint.

A user ID is required to use the printing and copying facilities of the Department. See Bobby Epling about setting up this account for yourself.

You can use phones for business-related calls locally. A code is required to place long distance calls and you will typically not be issued such a code. If you need to make calls for your work, see your advisor about perhaps using their code.

5.3 Procedures

5.3.1 Travel

Department Vehicles
The Department maintains a fleet of vehicles for performing research functions requiring travel. It is important to realize two things about this fleet:

- It is a *shared* resource, and
- *every* mile driven is charged to some account.

To use Department vehicles, covered by University insurance, you are required to have a driver’s license valid in the state of Alabama, be employed by the University, and to have completed the University Defensive Driving course. This is an online course that you register and there is a document [here](#) that explains the process of registering. An additional level of training (registered for through the same web site) is required to drive a University van (including the department’s van).

The University is self-insured, meaning that the costs for liability resulting from a vehicle accident are borne directly by the Department. These costs can be quite large. If you intend to operate a vehicle, please exercise extreme caution. Also, practice driving your own car before using one of the Department’s. As a driver of a University vehicle, you are a road ambassador and your competence and driving behavior are visible to citizens on the road with you. Please be professional, courteous, and cautious when driving.

The State of Alabama requires that proof of insurance be carried when operating a motor vehicle. Ms. Denham can provide you with a copy of the self-insured certificate for Auburn University. If the unthinkable happens and you are involved in an accident, there are procedures printed on the back of the card for how to handle the situation. Read through these procedures and become very familiar with them before driving.

You must sign out the vehicle you wish to use, which is done using an online reservation system (“Biosystems State Vehicle Online Checkout) found at [this website](#). Use your AU username and password for access. If your travel will begin or end outside of normal working hours, you must let James Johnson know at least one day prior to leaving. Mr. Johnson will ensure the key to the vehicle you are checking out will be in the lockbox hanging outside the main door on the loading dock of the Forest Products Lab. If you return outside working hours, leave the keys in the lockbox. Your regular Corley main door key opens the lockbox.

Vehicles (Dodge, GMC and Tahoe) are parked behind the Corley Building and Van at the Forest Products Lab and you are responsible for getting yourself to the Forest Products Lab if you are driving van. Be sure you are comfortable parking any vehicle you sign out - some are quite large. Choose the vehicle that is appropriate for the travel and work you intend to do. Trucks are best reserved for field work. In general it is best to not deprive your colleagues of the use of a vehicle parked for extended periods in airport parking lots — consider driving a personal vehicle or taking a shuttle.

Fuel purchases can be made using University credit cards. Your advisor can give one for you to use and give the receipts immediately to Mr. Rich Morbidelli (Corley 307). People (mainly faculty) will be angry if a vehicle is returned with very little gas so always refueling a vehicle after use is a good policy to adopt. In all cases, the vehicle should be refueled when less than 1/4 tank remains.

Always remove trash from the vehicle after use. If you drove through mud or a large swarm of bugs it would be a very good idea to clean the outside of the vehicle. There is a pressure washer in the shop that is perfect for the purpose. Vacuuming is a bit more difficult (but no less essential), you might consider stopping at a
commercial car wash place to get this done.

Someone has to pay for every mile driven so always write down on the sheet provided your name, the date, and the mileage you drove. Before leaving on your trip ask your advisor for an account to charge the mileage, or at least put something in that spot that will remind your advisor of what the purpose of the trip was. Mr. Morbidelli will be asking them in the near future what account will be charged.

**Travel and Travel Vouchers**

You may have to travel overnight for your research and, when you do, some of your expenses are reimbursable. How much you are reimbursed depends on the location you travelled to. The rules are published by the University and change quite frequently, so if there are questions ask Mr. Morbidelli or Ms. Denham.

Most of your travel expenses will have to be paid by you up front and you will be reimbursed after you return. Auburn University is a government agency and, as such, is a little less prompt in returning money they owe you than they are asking for money you owe them.

The exceptions to the rule on reimbursements are conference registration fees and air fares. Both of these expenses can be paid ahead of time using University funds. If your registration fee covers meals, your reimbursement for per diem expenses will likely be reduced.

Making travel arrangements is largely your responsibility. You must arrange your own air travel, for example, but there can be rules associated with the purchase of the ticket. This is especially true if you are using federal funds to pay for it. Always inform your advisor of your plans before committing to pay for anything related to travel. Once it’s booked, you are responsible for paying for it - not the University. They may decide not to reimburse if you violate some rule.

Fortunately, there aren’t a lot of rules to break in domestic travel. Most have to do with use of a University credit card and the expenses you are allowed to charge. Foreign travel is another story, but one that we won’t cover here.

Safety is always an issue when traveling. Travel in groups, if possible, and use common sense to avoid situations that might become dangerous. Act responsibly and professionally on the road - you are representing the BSEN Department and Auburn University.

**5.3.2 Purchasing**

University purchasing rules are not terribly complicated, unless you actually try to read and interpret them. It’s best to use a few simple rules of thumb and ask Mr. Morbidelli if you don’t know - he does.

Purchases of less than $3,000 can be made using a University credit card, subject to monthly limits imposed on the card. For items costing more than $2,500 a purchase order must be made through Procurement and Payment Services. This process will normally take a few days, so plan ahead if your requirements exceed
that amount. See Mr. Morbidelli about the process of submitting a purchase order.

If an item costs more than $10,500, Alabama law says that it must be purchased through a bid process. That will mean writing up a series of specifications for the item and preparing a list of potential sources. This will go to the Procurement and Payment office and the item will be advertised for competitive bid, the low bidder selected, and your item will be purchased. This process could take several weeks to complete.

For most purchases, a University credit card will suffice. Graduate students are not normally issued a card so you will likely be using one that is the responsibility of a faculty or staff member and they will not look kindly on you breaking a rule or losing a receipt. Here are the main rules associated with using a University card:

- Get a receipt. There are some rules about what information has to be on the receipt, but in general any receipt a store gives you will do. The main thing is have an amount, including shipping.
- Don’t pay sales tax. The State of Alabama is a tax exempt organization and, as such, has what is known as a tax ID number - actually, two of them The state tax ID is: 41506. The federal tax ID is: 63-6000724. When you tell a person at the checkout that this will be a tax-exempt purchase, they may ask for these numbers. The state number may be required for purchases made in Alabama. The federal number is for purchases outside of Alabama, although you may be asked for it even within the State.
- There are things you cannot buy with the card
  1. Food. You cannot purchase meals at a restaurant, for example, or groceries for lunch when you are working out in the field.
  2. Services. This includes a lot of potential pitfalls. For example, you can purchase a custom-made hydraulic cylinder, but you cannot pay someone to modify an existing cylinder.

5.4 Personnel
Please refer to the departmental website for faculty and staff.
Chapter 6

Graduate School Summary of Procedures

Below are quoted the Graduate School’s summaries of what has to be accomplished to earn a graduate degree. Also noted in bold are those things required by the Department in addition to the Graduate School edict.

6.1 MS Degree

Applying
1. Obtain application forms from the Graduate School and apply for admission by submitting completed forms and other required materials as outlined in the Graduate School Bulletin.
2. Apply for an assistantship, if pertinent, with the department involved.

First Semester
3. Become familiar with requirements for the desired degree as outlined in this bulletin.
4. Consult with departmental advisor and become oriented to departmental procedures.
5. Plan schedule of study for the first semester with advisor.
6. Establish an advisory committee through the department head or chair and departmental advisor; usually done during the first semester of course work.

Second Semester
7. Prepare a proposed Plan of Study in consultation with the advisory committee. Submit a plan approved by the committee and department head to the Graduate School no later than the beginning of the second semester. Refer Section 3.3.1 of this handbook for detail.
8. Consult with the advisor on approval for the thesis plan, if pertinent, and become familiar with the Guide to the Preparation and Sub- mission of Theses and Dissertations, available in the University Bookstore and on the Web ([www.grad.auburn.edu](http://www.grad.auburn.edu)).
9. Fulfill language requirements, if any. There are none for Biosystems Engineering.

One Semester before Graduation
10. Request graduation check in the Graduate School no later than the last day of the semester (graduation day) prior to the semester of graduation.

During the last Semester
11. Register for at least one course the semester of graduation.
12. Prepare thesis manuscript, if pertinent.
13. Arrange for final oral examination with advisory committee.

6.2 PhD Degree

Applying
1. Obtain application forms from the Graduate School and apply by submitting all required materials to
the Graduate School by the deadlines published in the Graduate School Bulletin. The Graduate School forwards the application to the appropriate departmental screening committee. The department head or chair then makes a recommendation to the dean of the Graduate School, who sends a letter notifying the applicant of the decision.

2. Apply for an assistantship, if applicable, through the department involved.

**First Semester**

3. Become familiar with the requirements for the doctoral degree as published in this bulletin.
4. Consult with the departmental advisor and become familiar with departmental procedures.
5. Plan a schedule of study for the first semester with advisor.
6. Submit a proposed schedule for fulfilling the residency requirements.
7. Acquire necessary forms at the Graduate School or on the Web at www.grad.auburn.edu.

**Second Semester**

8. Establish an advisory committee through the major professor and department head or chair. Official appointment of the advisory committee occurs when the Plan of Study is approved by the Graduate School.
9. Prepare a Plan of Study approved by the advisory committee and department head or chair and submit to the Graduate School. Refer Section 3.3.1 of this handbook for detail.
10. Complete a written Research Proposal and have it approved by the advisory committee.

**Completed within 2 years**

11. Complete course work, including language requirements, if any, as detailed in the Plan of Study. Biosystems Engineering has no language requirement.
12. Arrange for the general written and oral examinations through the advisory committee. After the written examination, schedule the general oral examination at least one week in advance using a form obtained from the Graduate School.

**Once Research Is Completed**


**One Semester before Graduation**

14. Request graduation application through AU Access no later than mid-term of the semester prior to the semester of graduation.

**During the last Semester**

15. Register for at least one course the semester of graduation.
16. Prepare dissertation and submit a committee-approved first draft to the Graduate School for review and approval by the University Reader, who serves as the representative of the graduate faculty.
17. Study recommendations of the University Reader and make appropriate changes in the dissertation.
18. On approval of the dissertation by the dean of the Graduate School, arrange for final oral examination.