

GRADUATE STUDENT HANDBOOK

**Master of Science in Biological Engineering
Master of Science in Engineering
Doctor of Philosophy in Engineering**

DEPARTMENT OF BIOLOGICAL
& AGRICULTURAL ENGINEERING

UNIVERSITY OF ARKANSAS



UNIVERSITY OF
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FOREWORD

This *Graduate Student Handbook* was prepared to familiarize graduate students with the general philosophy, policies and requirements for graduate study in the Department of Biological and Agricultural Engineering of the University of Arkansas. The handbook supplements information contained in the *University of Arkansas Graduate School Catalog* or *Graduate Student Handbook*. It is designed to acquaint graduate students with the general policies and requirements for graduate study in the Department of Biological and Agricultural Engineering (BAEG). It is not intended as a rigid set of regulations but rather as a guide so that the graduate program might be organized and performed expeditiously. This manual is also not intended to address every situation that will be encountered in a graduate program. More importantly, it does not relieve the students of the responsibility for following the regulations of the Graduate School and BAEG. Both the University's *Graduate School Catalog* and *Handbook* should be consulted for information concerning application requirements, registration fees, curricula offered, degrees granted, and general regulations and courses available. A copy of the *UA Graduate Catalog* and *Handbook*, application forms for admission, and requests for financial aid can be obtained from:

The Graduate School
119 Ozark Hall
University of Arkansas
Fayetteville, AR 72701
479-575-4401
Toll-free: 1-866-234-3957
FAX: 1-479-575-5908
TDD: 1-479-575-5909
Email: gradinfo@uark.edu

The *UA Graduate Student Handbook* is available online at:
<http://grad.uark.edu/dean/governance/gradstudenthandbook.php>

The *UA Graduate School Catalog* is available online at:
<http://catalog.uark.edu/graduatecatalog/>

Information concerning academic programs, fees, financial aid or housing on the Fayetteville campus, may be obtained from:

Director of Admissions
University of Arkansas
Fayetteville, AR 72701
479-575-5346
Toll-free: 1-800-377-8632
uofa@uark.edu

Admissions information and the undergraduate catalog are available online at:

- <http://admissions.uark.edu>
- <http://catalog.uark.edu/undergraduatecatalog/>

Specific BAEG departmental financial aid information, such as graduate assistant positions and tuition remission, and complete information about graduate study within the BAEG department can be obtained from:

Department of Biological and Agricultural Engineering
203 Engineering Hall
University of Arkansas
Fayetteville, AR 72701
479-575-2351
FAX 479-575-2846
- <http://www.baeg.uark.edu/>

Prospective students who have a special area of research interest and can identify a faculty member with a similar interest may wish to contact that faculty member directly (see Appendix A, Graduate Faculty).

BAEG DEPARTMENTAL PHILOSOPHY

The Department of Biological and Agricultural Engineering desires that each graduate student receives a broad and comprehensive educational experience. This experience includes social as well as intellectual development to lead students to an increased level of maturity. Certainly, coursework is primary, but social activities—the exploration of the unknown and the exchange of ideas with fellow students and faculty—are also part of the total educational experience. An additional part of this development process occurs through service to others. Students are encouraged to become involved in all departmental functions including teaching, research, extension, and social activities so that they may obtain the best possible education.

The core of graduate education lies in obtaining technical expertise in an area of specialization. Specifically, the objectives of the Master's and PhD engineering graduate program are for students to:

1. Develop the ability to comprehend and apply engineering principles in order to solve problems in research, development and design.
2. Obtain sufficient understanding of the mathematical, physical and biological sciences for comprehension of literature in these and related fields.
3. Acquire the skills required to use appropriate equipment, including instruments and computers, in solving problems in their areas of interest.
4. Achieve the technical competence necessary to teach college-level courses and conduct an adult education program (such as in Cooperative Extension).

In the attainment of the above objectives, graduate students will combine biological engineering courses with other engineering fields, the physical sciences, mathematics, statistics and the biological sciences in developing their program of study. The advanced degrees are primarily research degrees awarded for significant creative research or design accomplishment, and not for the completion of a specified number of courses. Therefore, a student's program concentration is on a significant thesis or dissertation problem completed under the supervision of members of the graduate faculty. This complements a program of strong course support to properly address the thesis or dissertation problem.

DEPARTMENTAL HISTORY

The Department of Biological and Agricultural Engineering has a rich history which has seen many changes since its beginnings in 1920. These changes reflect the advances seen in science, industry and technology as we move further and further from an agrarian society.

- 1921 Activation of the Department of Agricultural Engineering, which had been authorized at the University of Arkansas in 1920. In its early years, the department was housed in Gray Hall, located on the UA campus where Mullins Library now stands. The primary function of the department was to teach service courses and conduct applied research.
- 1950 First Bachelor of Science degree in Agricultural Engineering conferred.
- 1952 First Master of Science degree in Agricultural Engineering conferred.
- 1966 The department moved to a building nicknamed “the old agriculture building,” that had served as the campus infirmary. This 1905 building was renamed the Agricultural Engineering Building and housed the department until its move to Engineering Hall in 1990. The former infirmary is now named the Agricultural Annex. Construction completed for the Agricultural Engineering Research laboratory to replace facilities that were located initially on the site of the present Administration Building and later at the former Washington County Fair Grounds on the southwestern edge of campus.
- 1981 The High Bay building was constructed and other teaching facilities at the Engineering Research Center (Engineering South) were obtained beginning in 1981.
- 1984 First departmental Ph.D. in Engineering conferred.
- 1988 The department name changed to Biological and Agricultural Engineering.
- 1990 With renovations complete in Engineering Hall, the department moved to its present location [on the second floor] in Engineering Hall. The B.S. and M.S. degree names were changed to Biological and Agricultural Engineering to reflect the curriculum and the new name of the department.
- 1992 A major research project called the *HIDEC* (High-Density Electronics Center) purchased the High-Bay building from the department, leading to the expansion of the Agricultural Engineering Research Lab in order to accommodate the activities that had been going on at E South (now known as the Engineering Research Center).
- 2002 The B.S. and M.S. degree names were changed to Biological Engineering.
- 2003 Received approval for the Master of Science in Biomedical Engineering degree from the Arkansas Department of Higher Education.
- 2004 Total undergraduate enrollment was 110; graduate program was more than 40 students.
- 2005 Total undergraduate enrollment was 91; graduate program was more than 35 students.
- 2009 Total undergraduate enrollment was 109; graduate program was more than 35 students.
- 2012 Total undergraduate enrollment was 95; graduate program was more than 30 students.
- 2013 Total undergraduate enrollment was 84; graduate program was more than 27students.
- 2014 Total undergraduate enrollment was 86; graduate program was more than 23 students.

Department of Biological and Agricultural Engineering Today

BAEG is unique in that it is linked administratively to the [College of Engineering](#) and the [Arkansas Agricultural Experiment Station](#). At present, the department is experiencing growth in teaching, research and service. In particular, departmental research continues to strengthen and expand in its two broad areas of concentration:

- **Biotechnology Engineering** – biotechnology at the micro- and nano-scale, food processing, food safety and security, developing new products from biomaterials, biotransformation to synthesize industrial and pharmaceutical products, bioinstrumentation, bio-nano interfacing and molecular self-assembly, bio-nano plasmonics, and bio-nano sensing.

- **Ecological Engineering** – Integrates ecological principles into the design of sustainable systems to treat, remediate, and prevent pollution to the environment. Applications include mathematical modeling of watershed process, stream restoration, watershed management, water and wastewater treatment design, ecological services management, urban greenway design and enclosed ecosystem design.

The BAEG curriculum is under the supervision of the dean of the College of Engineering. Graduate degrees available are:

- Master of Science in Biological Engineering
- Master of Science in Engineering
- Doctor of Philosophy in Engineering

BAEG facilities are located on the University of Arkansas campus in Fayetteville in Engineering Hall, which is adjacent to the Bell Engineering building. Research and lab facilities are located north of the Fayetteville campus at the Agriculture Research and Extension Center, the Institute for Nanoscience and Engineering and the Center of Excellence for Poultry Science, “the farm,” south of campus at the Engineering Research Center, the Cooperative Extension Service in Little Rock, and Rice Research and Extension Center in Stuttgart. Departmental laboratory facilities include those for thermal processing, food safety, bio/nanosensors, bioinstrumentation, bioimaging, biotechnology, nanotechnology, bioreactor, water resources, machine vision, and precision agriculture. The department has ten faculty members and numerous adjunct faculty members. BAEG has five full-time extension engineers at its extension facilities based in Little Rock.

Details of the history of the University of Arkansas and its affiliates can be found online at:

- University of Arkansas System Division of Agriculture, <http://division.uaex.edu/findus.htm>
- College of Engineering, <http://engineering.uark.edu/>
- Arkansas Agricultural Experiment Station, <http://www.uark.edu/admin/aes/>
- Institute for Nanoscience and Engineering, <http://nano.uark.edu>

GRADUATE FACULTY/RESEARCH ACTIVITIES

BAEG faculty members represent a broad cross-section of age, geographical background, educational experience, research expertise, and academic interest. The faculty ranks very high nationally among peer departments in terms of externally funded support and well above average in presentation and publication of research results. The Department of Biological and Agricultural Engineering differs from most of its peer departments nationally in that Cooperative Extension Engineers are housed and administered separately from the research and teaching faculty. The extension engineers are, however, very much involved in the activities of the department and a part of the department faculty.

The department conducts research on problems of importance not only to Arkansas, but also to the entire nation. Graduate students are considered important members of the research teams. Graduate students contribute significantly to research through their thesis and dissertation activities. Typically, a thesis or dissertation constitutes part of a larger research program conducted by the student's major advisor. Historically, research topics have ranged from the very basic to the very applied, depending on the current focus of a particular research program and the interests and talents of both the graduate student and the major advisor. It is the view of the department that successful research is a team effort directed toward program objectives and may involve both extension and research expertise. The department has an active research program in many major areas of biological and agricultural engineering. A brief description of current research efforts is given on the department web site (<http://bio-ag-engineering.uark.edu/research/index.php>).

Prospective graduate students are encouraged to contact the faculty members directly if they are interested in more information about the possibilities of work on a particular project. That faculty member might then serve as the major advisor to the graduate student.

Appendix A, Graduate Faculty, contains a comprehensive list of faculty members along with their contact information and areas of current research.

BAEG GRADUATE STUDENT RESPONSIBILITY

Each graduate student should become familiar with and utilize the University of Arkansas Graduate School's *Catalog* and *Handbook*, as well as the BAEG Department's *Graduate Student Handbook*, as this is part of graduate education. The BAEG handbook is not intended as a rigid set of regulations, but rather as a guide so that the graduate program might be organized and perform expeditiously. It is intended to supplement information contained in the *Graduate School Catalog* and the *Graduate School Handbook*, which are the final authorities in terms of regulations and policy, except where BAEG Departmental requirements are more stringent. The BAEG handbook does not cover every situation that may be encountered in a graduate program and does not relieve students of their responsibility to follow regulations of the Graduate School and the department in a timely manner. In no case will a regulation be waived or an exception granted because a student pleads ignorance or asserts that advisors or other authorities did not present information. Students should consult with their major advisor and department head in situations where the policies of the department and the Graduate School appear to differ.

ACADEMIC HONESTY AND PLAGIARISM

Honesty in all things is a core value of the BAEG Graduate Program. All BAEG students are not only expected to display the highest level of personal honesty in their own actions, but also to stop any dishonesty they observe in the University environment.

UA Provost has implemented a uniform enforcement of Academic Integrity issues, and the BAEG program fully supports this policy enforcement. You should read all the information on the following links as these policies define what will happen in any case of academic dishonesty.

Academic Initiatives and Integrity: <http://honesty.uark.edu/index.php>

Plagiarism

It has been noted that incoming students may believe that portions of another person's work can be pasted into a document and sufficiently modified to make it non-plagiarized. This shows up most often in the first chapter of theses and dissertations when prior work and current state of the art are being discussed.

Please be clear on one point – each person writes in their own voice, which includes the choice of words and the manner in which words are placed. **YOU CANNOT MODIFY PRIOR WRITTEN TEXT ENOUGH TO MAKE IT NON-PLAGIARIZED!**

The advice of the BAEG Graduate Program is to always start from a blank page to write down the knowledge you have gained from reading other sources. These sources will be cited as your references attached to that section of your work.

If you feel that you must use someone else's exact words, either for clarity or because the original author's words may be used to emphasize a point, then use the following format:

*"You will note that the quotation is separated into a stand-alone paragraph that is not only contained in quotation marks, but is also indented a quarter inch more on both sides and put into italics. The reference number after the quotes is bogus in this case, but if this handbook contained reference footnotes it would say Private Communication from John Doe."*¹

Any document found to contain plagiarized material will be reported per the UA Academic Honesty Policy and the defined response under the Sanctions Rubric will be fully implemented.

University of Arkansas Policies

The full set of the Graduate School and University policies toward academic honesty and the honor code may be found in the Graduate Catalog at

<http://catalogofstudies.uark.edu>

and in the Graduate Student Handbook found at

<http://grad.uark.edu/dean/governance/gradstudenthandbook.php>

It is the responsibility of every BAEG Graduate Student to fully familiarize themselves with these documents. **Lack of knowledge of these policies will not be grounds for appeal of any sanction imposed as the result of violations of these policies.**

ADMISSION REQUIREMENTS

In general, admission to the Department of Biological and Agricultural Engineering graduate program is a three-step process. First, the prospective student must be admitted to graduate standing by the University of Arkansas Graduate School. Second, the student must be accepted into the department's program, which depends on transcripts, recommendations, a statement of purpose, and the following GPA and test scores:

A. Students with an ABET-Accredited or equivalent Engineering Degree

- Students to a MS program from a BS degree in engineering or to a PhD program from a BS degree in engineering and a MS degree:
 1. A score of 301 (1100 for the tests taken prior to August 1, 2011) or above (verbal and quantitative) on the Graduate Record Examination (GRE).
 2. A [TOEFL](#) score of at least 550 (paper-based) or 213 (computer-based) or 80 (Internet-based). This requirement is waived for applicants whose native language is English or who earn a Bachelor's or Master's degree from a U.S. institution.
 3. GPA of 3.00 or higher on the last 60 hours of a BS degree or BS and/or MS degrees.
 4. B.S. degree in engineering from an ABET¹ accredited program or equivalent.
- Students to a PhD program directly from a BS degree in engineering:
 1. A score of 307 (1200 for the tests taken prior to August 1, 2011) or above (verbal and quantitative) on the GRE.
 2. A [TOEFL](#) score of at least 550 (paper-based) or 213 (computer-based) or 80 (Internet-based). This requirement is waived for applicants whose native language is English or who earn a Bachelor's or Master's degree from a U.S. institution.
 3. A cumulative GPA of 3.5 or above for undergraduate work.
 4. B.S. degree in engineering from an ABET accredited program or equivalent.

B. Students without an Engineering Degree

- Students to a MS program from a non-engineering BS degree:
 1. A score of 301 (1100 for the tests taken prior to August 1, 2011) or above (verbal and quantitative) on the GRE.
 2. A [TOEFL](#) score of at least 550 (paper-based) or 213 (computer-based) or 80 (Internet-based). This requirement is waived for applicants whose native language is English or who earn a Bachelor's or Master's degree from a U.S. institution.
 3. GPA of 3.00 or higher on the last 60 hours of a BS degree.

¹ Accreditation Board for Engineering and Technology

4. Completion of 18 hours of engineering course work (listed below under Degree Requirements). Also see additional information below under the Admission Requirements for Master of Science in Biological Engineering.
- Students to a PhD program from non-engineering BS plus MS degrees:
 1. A score of 301 (1100 for the tests taken prior to August 1, 2011) or above (verbal and quantitative) on the GRE.
 2. A [TOEFL](#) score of at least 550 (paper-based) or 213 (computer-based) or 80 (Internet-based). This requirement is waived for applicants whose native language is English or who earn a Bachelor's or Master's degree from a U.S. institution.
 3. GPA of 3.00 or higher on the last 60 hours of BS and/or MS degrees.
 4. Completion of 18 hours of engineering course work (listed below under Degree Requirements). Also see additional information below under the Admission Requirements for Doctor of Philosophy in Biological Engineering.
 - Students to a PhD program directly from a non-engineering BS degree:
 1. A score of 307 (1200 for the tests taken prior to August 1, 2011) or above (verbal and quantitative) with 155 (700 for the tests taken prior to August 1, 2011) and 4.5 or above in writing on the GRE.
 2. A [TOEFL](#) score of at least 580 (paper-based) or 237 (computer-based) or 92 (Internet-based). This requirement is waived for applicants whose native language is English or who earn a Bachelor's or Master's degree from a U.S. institution.
 3. A cumulative GPA of 3.5 or above for undergraduate work.
 4. Completion of 18 hours of engineering course work (listed below under Degree Requirements). Also see additional information below under the Admission Requirements for Doctor of Philosophy in Biological Engineering.

Finally, a member of the faculty who is eligible (graduate status of group II or higher) must agree to serve as major advisor to the prospective student.

Details concerning [admission](#) for both international and domestic students are provided in the University's Graduate School Handbook.

I. Conditional Admission

Upon approval of the Graduate Dean, students that do not satisfy all admissions requirements may be considered for conditional admission to the BAEG department's graduate program. In order to be considered for conditional admission, a BAEG faculty member must agree to advise the student and petition the BAEG graduate committee with an explanation of the student's extraordinary circumstances, why the student should be conditionally admitted, and evidence that the student can successfully satisfy the degree requirements. If the petition is granted, the BAEG graduate committee will offer conditional admission and require, in consultation with the sponsoring faculty, the student to obtain a specified grade point average over a specified selection of course work to be completed within one or two semesters in the BAEG graduate program. The conditions for provisional admission will be provided to the student in the admission letter. The BAEG Graduate Coordinator will petition the Graduate Dean for removal of conditional

admission once all conditions have been met. If approved by the Graduate Dean, then the student will be awarded unconditional admissions status. See the UA Graduate School Handbook (<http://grad.uark.edu/dean/governance/gradstudenthandbook.php>).

II. Master of Science in Biological Engineering

Prospective students will only be admitted to the M.S. programs provided engineering competence can be demonstrated by satisfying one of the following criteria:

- a. Receipt of a B.S. degree in engineering from an ABET accredited program or equivalent.
- b. Students not possessing engineering undergraduate degrees often pursue graduate degrees in Biological Engineering. Students without an ABET accredited engineering degree (or equivalent) can be admitted to the program but must earn credit for the following 18 hours of coursework in addition to Master's requirements (Additional hours may be required for prerequisites). See details of coursework under the Degree Requirements.

Note: Students without ABET accredited undergraduate degrees cannot typically obtain a PE license to practice engineering. Completion of the above deficit courses is not sufficient to meet this requirement.

III. Additional Information for Master of Science in Engineering

This advanced degree plan offers a non-thesis option. See the UA College of Engineering webpage regarding Master of Science in Engineering (<http://mse.uark.edu/>).

IV. Doctor of Philosophy

Admission to the departmental aspect of the Ph.D. program depends strongly on the judgment of the individual professor who will serve as the graduate advisor. Unless the candidate has a Master of Science degree in Engineering with a thesis, however, the following admission criteria apply.

- a. Students with a B.S. degree in engineering from an ABET accredited program may be considered for the Ph.D. program based on their excellent academic records and/or outstanding research experience (listed above under Admission Requirements). The Departmental Graduate Committee will make a specific recommendation to the Department Head.
- b. Students with both B.S. and M.S. degrees not in engineering will be required to demonstrate engineering competence by passing all deficiency courses (listed below under the Degree Requirements).
- c. Students with a non-engineering B.S. degree may be considered for admissions into the Ph.D. program provided they meet the criteria outlined above under Admission Requirements. Otherwise, they need to start an M.S. program first. The Departmental Graduate Committee will make a specific recommendation to the Department Head. Also, students must demonstrate engineering competence by passing all deficiency courses (listed below under the Degree requirement).

All students should be aware that they cannot practice engineering without a professional engineer (PE) license and they may not be able to obtain a PE license without possessing an ABET accredited B.S. degree in engineering or the equivalent.

FINANCIAL CONSIDERATIONS

I. Tuition and Fees

Tuition and fees for graduate students at the University of Arkansas may be broadly categorized into the following groups: [registration fees activity fees, non-resident fees, special fees and engineering fees](#). Every student is responsible for ensuring that his or her tuition and fees are paid. Graduate assistants on 50% appointment have their tuition paid from one of the sponsored research projects of their faculty advisor. Fulltime employees may take graduate courses for a charge of 10% of the usual tuition. Special fees include charges for items such as late registration, transcripts and drop-add procedures and are paid by the student. Many of the special fees are related to the processing of degree applications and are charged during the semester in which the student graduates.

A complete explanation of costs involved in attending the University of Arkansas is provided on [the UA Office of the Treasurer web site](#).

II. Financial Assistance

Graduate Assistantships – In the department, available graduate assistantships that are funded by state appropriations are awarded by the department head to qualified applicants. Considerations include academic record, needs of the departmental faculty, interest of the student, and timeliness of the application. Conditionally admitted students do not qualify for these graduate assistantships until unconditional admissions status is awarded. Applicants will be notified as soon as the selection process is complete.

Graduate students with half-time graduate assistantships or greater, costs for tuition are waived and will be paid by the department. Current stipends quoted below for graduate assistantships are in addition to the tuition waiver and are as follows:

- M.S. candidates - \$13,000 per year.
- Ph.D. Candidates - \$18,000 per year.

For particularly outstanding candidates for the PhD, supplemental funding is available in the form of Walton Fellowships as described below. Depending upon funding available through the research project on which the student will be working, the Distinguished Doctoral Fellowship may range from \$30,000/yr up to \$38,000/yr, plus waiver of tuition, for up to 4 years. The Doctoral Academy Fellowship may range from \$20,000/yr up to \$28,000/yr, plus waiver of tuition, for up to 4 years. See further information on the Walton Fellowships.

Note that financial support **stops** at the end of the year students declare their final year, and receive the increased stipend. Therefore, care should be taken in making that declaration of final year (or for completion of 15-hour mark for M.S. students). Once the final year (or 15-hour) declaration is made, the student must complete the graduate program within a year. If the student does not finish within that year, financial support will have ended and will **not** be available for additional time.

If the Graduate Assistantship is funded through a grant, the faculty member serving as the grant's principal investigator will make the decision as to who will receive the assistantship in accordance with University of Arkansas policy.

Information on other financial aid (loans and jobs) can be obtained from the [Student Financial Aid Office](#).

DEGREE REQUIREMENTS

Please consult the Graduate School's [Graduate School Handbook](#) and [Graduate School Catalog](#) for information on degree requirements from the University of Arkansas.

I. Selection of Major Advisor

The student/advisor selection procedure begins with the department's admission requirement that a professor be available and willing to work with the prospective student. The name of the major advisor is provided to the Graduate School at the same time that admission to the department's graduate program is granted. Therefore, it is suggested that prior to applying, all prospective students contact faculty members with whom they share mutual research interest. The major advisor should be a BAEG faculty member. BAEG adjunct faculty may serve as one of co-advisors with a BAEG faculty member, but cannot serve as sole major advisor. The major advisor-graduate student working relationship is a very important factor in determining the quality of the graduate education experience. It is essential that the prospective student and major advisor have open honest discussions concerning the expectations of each relative to the other before final selection is made.

Circumstances may arise in which the major advisor has not been selected prior to admission to the department's graduate program. In such cases, the department head will serve as the student's major advisor until a permanent major advisor is selected. This should occur no later than the end of the first semester of graduate study and, in most situations, it is expected that the selection process will be made early in the first semester.

Remember, however, that the selection process is mutual; that is, the professor also chooses the students with whom he or she wishes to work. In addition, the interest of the major advisor is, by necessity, often driven by research contracts. Thus, the research area chosen by the student is expected to fit into the overall research program of the advisor. If the student wishes to change major advisors, the request should be made both orally and in written form to the department head for approval. The department head will consult with all parties involved before establishing the conditions, if any, under which the change may be made. Similarly, the student should consult with the department head in situations where his or her major advisor is unable to continue to serve in that capacity.

II. Advisory Committees

A. Master's Program Advisory Committee

Every M.S. student is to have an Advisory Committee established during the first semester of graduate study. The graduate student, in consultation with his or her major advisor, should select an Advisory committee consisting of at least three members, which includes the major advisor and one graduate faculty member from outside the department. All involved will comprise the examining committee for the student. Once

the Advisory Committee has been selected, the [Master's Program Advisory Committee form](#) must be submitted to the department head and Graduate School.

The major advisor is appointed immediately after the student is admitted to the program of study. Again, the major advisor should be a BAEG faculty member. BAEG adjunct faculty may serve as one of co-advisors with a BAEG faculty member, but cannot serve as sole major advisor. The Master's Program Advisory Committee oversees the student's program of study and is chaired by the major adviser. The major advisor frequently, but not always, also serves as thesis director and the Master's Program Advisory Committee serves as the Master's Thesis Committee.

B. Doctoral Program Advisory Committee

Each student's program is guided by a major advisor and an Advisory Committee. Their purpose is to give continuity of direction and counsel and provide intellectual stimulation from the earliest days of residency through the completion of the doctorate. Again, the major advisor should be a BAEG faculty member. BAEG adjunct faculty may serve as one of co-advisors with a BAEG faculty member, but cannot serve as sole major advisor. The major advisor, in consultation with the student, selects the Advisory Committee, subject to review and approval by the Engineering Academic Programs Committee and the Dean of the Graduate School. Once the Advisory Committee has been selected, the [Doctoral Committee](#) form must be submitted to the department head and Graduate School.

The Advisory Committee provides advice to the student and specifically sets requirements within the applicable program, Graduate School, and University regulations, which the student must meet in pursuit of the doctorate. The student has the responsibility of interacting with the Advisory Committee and keeping them informed of his or her progress. The Advisory Committee has a minimum of four members. The major advisor serves as Chairman. At least one of the other members, in addition to the major advisor, must be from the department and one other must be from another department in the College of Engineering. All members of the committee must be members of the Graduate Faculty of the University of Arkansas and three (including the major advisor) must possess full Graduate Faculty status.

The Advisory Committee must be kept at its full complement throughout the graduate career of the individual student. In the event of a vacancy on the Committee (occasioned by resignation, faculty leave, or inability to serve), an appropriate replacement must be made prior to the making of any committee decision. In the case of resignation, the committee member must formally resign in a letter to the Graduate School. The major advisor must write a letter to add a new member, and the form specifying membership in the Advisory Committee must be resubmitted.

All decisions of the Advisory Committee are made by majority vote. The major advisor is responsible for transmitting Advisory Committee decisions to the Engineering Academic Programs Committee and the Dean of the Graduate School.

In addition to advising and program planning, the Advisory Committee is also involved with the administration of the qualifying examination, the supervision of the preparation of the dissertation, and the administration of the Final Examination on the dissertation. The Doctoral Program Advisory Committee is appointed immediately after the student submits a Declaration of Intent to study in a doctoral program. It evaluates the student's preparation and fitness for graduate study at the doctoral level. If the student has chosen a major adviser to direct the doctoral research, that professor chairs the Advisory Committee. The Program Advisory Committee develops the student's program of study and monitors progress in it. This group may or may not have the same composition as the Doctoral Dissertation Committee.

C. Annual Progress Report

BAEG graduate students are required to participate in an annual review of academic progress. At a minimum, the review will cover progress in completing courses with an adequate grade point, in completing all required examinations, in completing the thesis/dissertation/project requirements, and towards completing any other requirements for the degree as listed in the handbook. Reviews will be completed in June 30th of each year, reflecting performance over the prior academic year, but no more than thirteen (13) months may lapse between successive reviews. Any student that fails to arrange for and complete an annual review will not be allowed to enroll in courses in the following semester.

The purpose of the Annual Progress Report is to keep the Advisory Committee informed of progress so that it can function in its intended capacity. It also provides an opportunity for the student and the major advisor to gauge progress and adjust the program if necessary. The Annual Progress Report should include a brief, written summary of the student's academic and research progress in the previous academic year as well as a brief discussion of plans for the upcoming year.

It is the student's responsibility to self-assess their performance and to submit the Annual Progress Report to the student's advisory committee for approval. Upon the approval of the advisory committee, the student submits the report to the major advisor and arranges a face-to face interview with the major advisor. Both the graduate student and the major advisor will sign the documented outcomes of the annual review, which include: (1) the Annual Progress Report and (2) the Annual Academic Graduate Student Academic Review form. The major advisor submits the completed and signed forms to the BAEG department head. The department head is required to review and approve any identified corrective actions. In the event that planned corrective actions are not deemed to be adequate, then the student will be removed from the program. All the review processes should be completed by June 30th of each year.

III. Graduate Course Selection

There is a wide selection of courses that may be incorporated into a graduate program. All courses that are listed in the Graduate Catalog are categorized as being acceptable for graduate credit. Other courses may be included if approved by the Advisory Committee and the Graduate School. In general, the selection of courses depends on the student's interests and the nature of the research program. Basic and fundamental courses related directly to the area of Biological Engineering and of specific interest to the student will constitute the major part of the course program. Non-Biological Engineering courses should consist of courses that support the graduate's major work.

IV. Course Requirements

A list of [engineering courses](#) offered for graduate credit by the department is given on the [Department's web page](#) and in the [Graduate School Catalog](#). It would be expected that at least one course in mathematics or statistics be included in the student's graduate program. In addition, one-half of the formal coursework should be at the 5000 level or higher.

All BAEG graduate students should meet the following course requirements:

- (1) At least one advanced math or statistics course,
- (2) BENG 5801 Graduate Seminar (1 hour for M.S. and 2 hours for Ph.D. students), and

- (3) All Ph.D. graduate students are required to take at least 12 hours, and all M.S. students are required to take at least 9 hours of formal coursework at the 5000 level or higher (excluding Thesis and Seminar) in Biological Engineering. This course work will need to include two of the three following courses: BENG 5103 (Advanced Instrumentation), BENG 5603 (Modeling and Simulation), and BENG 5703 (Design and Analysis of Experiments for Engineering Research).

In addition, for the students in MS programs and in PhD programs with a MS degree, no more than six hours of BENG 500V (Advanced Topics in Biological Engineering) may be presented for degree credit. For students to a PhD program directly from a BS degree in engineering, no more than twelve hours BENG 500V may be allowed.

A. M.S. Degree in Biological Engineering

A minimum of 24 hours of acceptable course credit is required beyond the B.S. Degree plus 6 semester hours of BENG 600V (Master's Thesis). There is no non-thesis option. Courses taken prior to acceptance for graduate study cannot be used in meeting this requirement. The following describes the general MS degree requirements (see Appendix C: MS Degree Check Form).

1. Not less than 24 semester hours of coursework acceptable to the committee.
2. A minimum of six semester hours of thesis (BENG 600V).
3. No grade lower than "C" on graduate coursework.
4. Selection of graduate committee and preparation of written Program of Study within the first semester.
5. Earn a minimum cumulative grade-point average of 3.0 on all graduate courses attempted and continued good standing with the Graduate School.

B. Ph.D. Degree in Engineering

Please consult the Graduate School Catalog for the [Ph.D. program objectives](#). The Department follows the Engineering College's requirements for the Ph.D. program.

In addition to the requirements of the Graduate School, the following requirements have been established by the College of Engineering for all doctoral graduates:

1. All students must meet complete a minimum of 78 semester hours of graduate-level credit beyond the engineering bachelor's degree, including a minimum of 48 semester hours of course work and a minimum of 30 semester hours of dissertation research credits.
2. A minimum of 30 semester hours of course work must be at the graduate level (5000 or above).
3. No grade lower than "C" on graduate coursework.
4. Upon recommendation of the student's advisory committee, a student who has entered the Ph.D. program after a master's degree in engineering may receive credit for up to 30 semester hours. If the 30 hours includes master's thesis research, the advisory committee may credit up to 6 hours of thesis research toward the minimum dissertation research requirement.

5. Complete a minimum of nine semester credit hours of coursework in a set of coherent courses in a related subject area approved by the student's advisory committee.
6. Earn a minimum cumulative grade-point average of 3.0 on all graduate courses attempted and continued good standing with the Graduate School.

D. Deficiency Course Requirement for Students with Non-Engineering Degree:

Prior to completing the above listed M.S. or Ph.D. course work, students admitted to the M.S. or Ph.D. program without an ABET-accredited or equivalent engineering degree must demonstrate engineering competence by passing 18 hours of the following deficiency engineering course work. The deficiency course work does not count toward the course requirements of the M.S. and Ph.D. degrees. The required deficiency courses are:

1. A minimum of 15 credit hours of 2000 level or above of engineering courses (with course prefix BENG, BMEG, CHEG, CVEG, CENG, ELEG, INEG, or MEEG) currently allowed for credit within the BENG undergraduate program.
2. Minimum of 3 credit hours of one of the following BENG courses: BENG 3653 (Global Bio-Energy Engineering), BENG 4743 (Food and Bio-Product Systems Engineering), BENG 4933 (Sustainable Watershed Engineering), and BENG 4663 (Sustainable Biosystems Design).

Specific deficiency courses are to be determined in consultation with the student's major advisor and advisory committee. Please note that courses in addition to those listed above may be required for students without required prerequisites for the deficiency courses (such as life sciences and/or math/physics/chemistry prerequisite courses).

E. Seminars

BENG 5801 is a seminar course where the students will hear about the various graduate research projects and outside speakers and will have the opportunity to report on their own work. M.S. students are required to take 1 hour of BENG 5801 and Ph.D. students to take 2 hours. However, unless prevented from doing so by class scheduling, each graduate student is expected to attend the class even if s/he is not registered for the class.

In addition, the presentation of research information in an open forum is a valuable part of graduate education. During the course of study, each graduate student will normally present two seminars to the department. One of these will occur after the research problem has been defined and thoroughly analyzed, and the specific objectives enumerated. The other will be presented near the end of the study when the conclusions and results of the study are known. It is the responsibility of the student, in consultation with his or her major advisor, to arrange with the department head for a time for the presentation. Each graduate student is expected to attend the departmental seminars unless prevented from doing so by class scheduling.

G. Supplementary Courses

Many students find AGRN 5103 - *Scientific Presentations* and AGAD 5012 - *Seminar on Scientific Writing* to be very helpful in augmenting their graduate programs.

V. Transfer of Credits

Approval of transfer hours lies with the major advisor and Thesis Advisory Committee. Courses to be taken in Ph. D. programs are addressed by the major advisor and Doctoral Advisory Committee subject to approval by the Engineering Academic Programs Committee and the Dean of the Graduate School. Consideration is given to graduate courses taken previously when formulating the student's Ph.D. program.

VI. Thesis and Dissertation Credit

A. [M.S. Degree](#) in Biological Engineering

The student's [Thesis Committee](#) and [Thesis Title](#) must be reported to the department head and Graduate School at least one semester before the final exam.

B. [Ph.D. Degree](#) in Engineering

The student's [Dissertation Committee](#) and [Dissertation Title](#) must be reported to the Department Head and Graduate School at least one semester before the final exam.

VII. Plan of Study

A. **M.S. Degree in Biological Engineering**

The M.S. Degree in Biological Engineering (M.S.B.E) is a research degree requiring a minimum of 24 course hours, six semester hours of BENG 600V, and a thesis. During the first semester, the student should consult with the major advisor about (1) choosing a thesis topic or special research problem; (2) developing an appropriate plan of courses; and (3) selecting a thesis (or special problem) Advisory Committee. Prior to the beginning of the second semester, a plan of study containing coursework and thesis topic must be submitted to the Advisory Committee, who, upon approving the plan will in turn submit it to the department head for review and placement in the student's records. The departmental plan of study form is available from the Secretary.

Coursework should relate to the thesis problem area and aid in developing a thorough understanding of the basic sciences pertinent to the thesis problem. Changes to the program are subject to approval by the major advisor and the Advisory Committee. Again, the plan of study is to be completed during the first semester of graduate study and is considered to be the mutual responsibility of the student and the major advisor.

B. **Ph.D. Degree in Engineering**

The Ph.D. Degree in Engineering is a research degree awarded through the College of Engineering in cooperation with the Graduate School (at the University of Arkansas, there is a common Ph.D. degree for all engineering disciplines). Procedures for developing a plan of study are much like those presented earlier. During the first semester, the student should consult with the major advisor about

(1) choosing a dissertation problem; (2) developing an appropriate plan of courses; and (3) selecting a Doctoral Advisory Committee. A plan of study containing coursework and dissertation topic must be submitted to the Doctoral Advisory Committee, who, upon its approval and approval of the Engineering Academic Programs Committee and the Dean of the Graduate School, will in turn submit the plan to the department head for review and placement in the student's records.

Coursework should relate to the dissertation problem area and aid in developing a thorough understanding of the basic sciences pertinent to the thesis problem. Changes to the program are subject to approval by the major advisor and the Doctoral Advisory Committee. Again, the plan of study is to be completed during the first semester of study and is considered to be the mutual responsibility of the student and the major advisor.

VIII. Content of Theses and Dissertations

The purpose of the thesis or dissertation is to provide the student with problem-solving experience that involves most aspects of research. The traditional scientific approach to problem solving includes the elements of thesis development, experimental design, data collection and hypothesis testing. Recognizing that engineering research projects do not all fit neatly into the traditional research mold, the graduate faculty of the Biological and Agricultural Engineering Department has divided graduate theses into the three broad areas of Hypothesis Development and Testing, Experimental Design, and Systems Analysis. In each of these areas, suggestions are made for the content of the research project and thesis. Regardless of the research area, it is strongly recommended that the Ph.D. dissertation have a significant experimental orientation involving the design and construction of research apparatus as well as collection of data.

A. Hypothesis Development and Testing

Research projects oriented toward hypothesis development and testing should contain the following elements:

1. Literature Review - A review of the pertinent literature that summarizes and critiques the state of the knowledge in the research area.
2. Hypothesis (Model) Development - Development of a testable hypothesis or model that addresses a significant problem in the research area.
3. Experimental Design - Design of an experiment to collect data to test the hypothesis or model, and construction and calibration of the necessary research apparatus.
4. Data Collection and Analysis - Collection and reduction of data necessary to test the hypothesis or model.
5. Hypothesis (Model) Testing - Use of the data collected to test the hypothesis or model using the appropriate experimental design.

B. Experimental Design

Research projects with objectives to develop a unique engineering design should have the following elements:

1. Problem Definition - Review and analysis of the pertinent literature to define the design requirements for the given situation.
2. Component Design and Testing - Design, construction and testing of components necessary to perform the required operations, using laboratory and field tests as appropriate.
3. Final Design and Performance Testing - Use of results of Item 2 to develop a final design. Performance tests should be documented.

C. Systems Analysis

Research projects which result in the utilization of a systems or operations research approach to a problem should contain the following elements:

1. Defining the Problem - Review of the pertinent literature on the subject and definition of the problem.
2. Selection and Approach - Defining of the methods available for solving the problem and selecting an approach to the problem.
3. Model development and Validation - Development of a model of the system and methods to be used to validate the model and model components as appropriate.
4. Sensitivity Analysis - Analysis, as appropriate, of the sensitivity of the model to input parameters and model coefficients.
5. Final analysis and Conclusion.

IX. Language Requirements

A. M.S. Degree

There is no foreign language requirement for the M.S. Degree.

B. Ph.D. Degree

There is no foreign language requirement for the Ph.D. Degree.

X. Residency

A. M. S. Degree

[Residency requirements](#) follow the Graduate School guidelines for both non-appointed graduate students and graduate assistants.

B. Ph.D. Degree

The [Graduate School policy](#) may be satisfied by students in the department who hold Appointments as Graduate Assistants.

XI. Admission to Candidacy

In addition to following the [Graduate School requirements](#), the department also requires that competency in engineering be demonstrated as outlined previously in the section describing Biological Engineering Degree Requirements.

XII. Examinations

A. M.S. Degrees (M.S.B.E. and M.S.E.)

The Department requires a thesis written proposal defense and an oral comprehensive examination. The examinations are conducted by the major advisor and committee approved by the Graduate School Dean. Completed evaluation rubrics must be submitted to Department Head at the end of each examination (See Evaluation Rubrics in Appendix C).

1. M.S. Thesis Proposal Defense

All M.S. students are required to present a written proposal to their advisory committee for the purpose of defining their research program at least one semester before completing all other requirements. The student's advisory committee will determine the detailed format of the proposal defense. The outcome of the written component (pass or fail) must be determined at the time the first complete draft of the proposal is submitted. Also, determined at the time of the written examination are revisions to the proposed research plan. Students may retake a failed proposal defense once, contingent upon approval of the student's advisory committee. A student who fails the proposal defense twice will be terminated from the program. Under no circumstances will a student be allowed to take the proposal defense more than twice.

2. M.S. Final Examination

The candidate's final examination for the master's degree will be oral. The major professor will forward to the Dean of the Graduate School, not less than ten (10) days before the date of the final oral examination, an abstract of the thesis accompanied by a memorandum announcing the date, time, and place of the oral examination. The examination will be primarily concerned with the field of the thesis, but may also include other aspects of the candidate's graduate work. This examination can be open to the public. The examining committee shall consist of the student's advisory committee and others who may be included at the discretion of the major professor and the Dean of the Graduate School.

B. Ph.D. Degree

The Department requires the following three examinations to prepare students to become independent researchers: (1) a preliminary examination, (2) a dissertation proposal defense, and (3) a final comprehensive oral examination. Note that upon satisfactorily completing both the preliminary examination and the proposal defense and approval of the advisory committee, the student will be admitted to candidacy and proceed toward completion of the remaining requirements for the degree. Also, note that completed evaluation rubrics must be submitted to

Department Head at the end of each examination (See Evaluation Rubrics in Appendix C).

1. Ph.D. Preliminary Examination

The preliminary exam measures a candidate's core competency and depth in a narrowly focused area of specialization sufficient to understand and advance the current state of the art research. After completing the Ph.D. course requirements and at least six months before completing the Ph.D. proposal defense requirement (see below), the prospective candidate must take the preliminary examination. Preliminary exam will be administered by the student's advisory committee. The student's advisory committee will determine the detailed format of the preliminary exam. The preliminary exam must be written, followed by a face-to-face Q&A meeting by the student advisory committee. The preliminary exam should cover not only general didactic knowledge in biological engineering but also measure the student's potential preparedness in a narrowly focused area sufficient to develop a rigorous research plan. The advisory committee may also include additional written or oral components and examine the student on any subject, such as all course work listed on the degree program. The format of the compulsory written component of the preliminary examination is as follow:

The compulsory written component assesses the student's ability to prepare a cogent scientific argument. It should include five key components:

- a) A literature review justifying the key hypotheses and experimental design.
- b) A list of hypothesis-, design- and/or discovery-driven objectives proposed for study.
- c) A detailed methodology by which the hypotheses or designs are to be tested.
- d) A preliminary data section that demonstrates the feasibility of the proposed research, including the student's ability to perform the necessary work.
- e) A timeline for completion of the proposed work.

Similar to a research proposal, the compulsory written document must be sufficiently detailed so that each of the above areas can be fully evaluated by the advisory committee. However, the written preliminary document must not include extraneous data or superfluous information. A typical written preliminary document is 15-30 single spaced pages including figures and tables, but not including references or appendices. Different research groups may expect different formats for this document. It is important that these expectations be discussed with the major advisor prior to preparing the document.

In addition, the compulsory written component assesses the student's competence in technical areas including prior coursework, knowledge relevant to the proposed research, and broad understanding of the scientific method. It also assesses understanding of the proposed research area, and why the proposed research plan is the most appropriate and practical approach plan given the current state of scientific understanding and the available resources.

Finally, the Q&A meeting assesses the student's ability to respond to questions with rational and considered answers founded in the scientific method. Please note that questions will be asked to probe the student's depth and breadth of understanding beyond that included in the written document.

The outcome of the preliminary exam (pass or fail) must be determined at the time of the Q&A meeting. Also, determined at the time of the Q&A meeting are revisions to the proposed research plan. Students may retake a failed preliminary exam once, contingent upon approval of the student's advisory committee, within one year after the first exam. A student who fails the preliminary examination twice will be terminated from the program.

Under no circumstances will a student be allowed to take the preliminary examination more than twice.

2. Ph.D. Proposal Defense

The purpose of the dissertation proposal defense is to assure that the students' plans of researching their proposed dissertation research questions are complete and holds academic and scientific merits. All Ph.D. students are required to present a written and an oral proposal to their advisory committee for the purpose of defining their research program at least 6 months after completing the Ph.D. preliminary examination, and at least one year before completing all other requirements. The student's advisory committee will determine the detailed format of the proposal defense. The outcome of the oral and written components (pass or fail) must be determined at the time of the oral examination. Also, determined at the time of oral examination are revisions to the proposed research plan. Students may retake a failed proposal defense once, contingent upon approval of the student's advisory committee. A student who fails the proposal defense twice will be terminated from the program. Under no circumstances will a student be allowed to take the proposal defense more than twice.

Admission to Ph.D. Candidacy: Upon satisfactorily completing both the preliminary examination and the proposal defense and approval of the advisory committee, the student will be admitted to candidacy and proceed toward completion of the remaining requirements for the degree. The major advisor is to submit a letter to the Graduate School stating the date and results.

3. Ph.D. Final Examination

The candidate's final examination for the degree of Doctor of Philosophy will be oral. The major professor will forward to the Dean of the Graduate School, not less than ten (10) days before the date of the final oral examination, an abstract of the dissertation accompanied by a memorandum announcing the date, time, and place of the oral examination. The examination will be primarily concerned with the field of the dissertation, but may also include other aspects of the candidate's graduate work. This examination is open to the public. The examining committee shall consist of the student's advisory committee and others who may be included at the discretion of the major professor and the Dean of the Graduate School.

XIII. Submission of Technical Paper to a Journal

Candidates for the M.S. in Biological Engineering must prepare a paper suitable for submission as a refereed article from graduate research. It is not required that the paper be submitted for publication, but it must be prepared and approved by the major professor.

Candidates for the Ph.D. in Engineering must prepare a paper suitable for submission as a refereed article from graduate research. It is not required that the paper be accepted for publication, but it must be approved by the major professor and be submitted.

XIV. Other Requirements

Candidates for the M.S. in Biological Engineering must complete: (1) annual progress reports as detailed in the Section II.C. under Degree Requirement (p. 16), (2) the completed evaluation rubrics for the proposal defense and final examination, and (3) the exit review (by the Department Head).

Candidates for the Ph.D. in Engineering must complete: (1) annual progress reports as detailed in the Section II.C. under Degree Requirement (p. 16), (2) the completed evaluation rubrics for the preliminary examination, proposal defense and final examination, and (3) the exit review (by the Department Head).

NOTE: Overall summary of degree requirements is available in Appendix C.

XV. Academic Dismissal and Grade Point Requirements

Students may be dropped from further study in the Graduate School if at any time their performance is considered unsatisfactory as determined by either the program faculty or the Dean of the Graduate School. Academic dishonesty and failure to maintain a specified cumulative grade point average are considered to be unsatisfactory performance.

If a graduate student has less than a 2.85 cumulative grade point average on 12 or more semester hours of graded coursework taken in residence for graduate credit, the student will be placed on academic probation. The student will subsequently be dismissed from the Graduate School if the cumulative GPA is not raised to 2.85 or above on the next nine hours of graded graduate coursework. Using its own written procedures, the graduate faculty of an academic degree program may recommend that the student be readmitted to the Graduate School. (See Departmental Requirements described below.)

The graduate faculty of any degree program may establish and state in writing requirements for continuation in that program.

In order to receive a master's degree, a candidate must present a minimum cumulative grade point average of 2.85 on all graduate courses required for the degree. Failing to earn such an average on the minimum number of hours, the student is permitted to present up to six additional hours of graduate credit in order to accumulate a grade point average of 2.85; but in no case shall a student receive a degree who is obliged to offer more than six additional hours of credit beyond the minimum. In the computation of grade point, all courses pursued at this institution for graduate credit that is part of the degree program (including any repeated courses) and the thesis (if offered) shall be considered.

Students who repeat a course in an endeavor to raise their grade must count the repetition toward the maximum of six additional hours. Individual departments may have higher grade standards.

From the Engineering section of the Graduate School Catalog a minimum cumulative grade-point average of 3.00. Minimum grades of "B" are required on 80 percent of the graduate hours taken for credit towards the M.S.E. degree, and under the requirements for the Ph.D. degree an average above "B" on all graduate courses attempted.

For the M.S.B.E., the department requires a cumulative grade point average of at least 3.00 on all graduate courses attempted as part of the student's plan of study. The minimum acceptable grade on a graduate course is "C".

XVI. Time Limit for Graduate Students

A. M. S. Degree

Time limits follow the [Graduate School guidelines](#) for both non-appointed graduate students and graduate assistants.

B. Ph.D. Degree

Time limits are set by the [Graduate School guidelines](#).

NOTE: *Overall summary of degree requirements is available in Appendix C.*

DEPARTMENTAL ADMINISTRATIVE PROCEDURES AND POLICIES

I. Orientation

Upon arrival at the University of Arkansas, the graduate student should contact the Head of the Biological and Agricultural Engineering Department or his or her major advisor (if one has been assigned prior to arrival) for further instructions.

If office space is available, it will be assigned by the department head. Other equipment will be assigned by the major advisor as needed. The student may obtain keys for his or her office and for the entrance into Engineering Hall, upon approval from the department head and initiation of the required forms (obtained from the Departmental Administrative Manager). Keys are then obtained from the Physical Plant.

II. Registration

Students expecting graduate credit must be enrolled in the Graduate School. Graduate students will conform to the general registration schedule of the University and may not enter later than the last allowable date set by the Registrar. Before registering, a graduate student must meet with the major advisor. A graduate student should confer with the major advisor to formulate a course program before each semester's registration. Such consultation in preparation for registration should be well in advance of the day of registration. If a major advisor has not been appointed, the department head should be consulted about the course program. The following schedule should be followed in registration and pre-registration:

1. Consult with major advisor or department head. Complete Departmental Registration Form.
2. Once form is signed by major advisor the form is then to be turned into the Departmental Administrative Manager and the negative service indicator for advising will be removed.
3. Follow registration instructions in Schedule of Classes.
4. Graduate Assistants must have fee waivers processed by the Departmental Accountant.

III. Academic Load

Under ordinary circumstances graduate registration is limited to 18 hours for any one semester including undergraduate courses and courses audited.

The Graduate School requires that full-time graduate assistants take a minimum of 6 hours each fall and spring semester and 3 hours in any summer session while on appointment. Hard-funded Graduate assistants in BAEG, however, are on nine-month appointments, and are paid hourly wages for the summer months. Thus, they are not required to register in the summer sessions. A graduate assistant who needs to register in the summer should consult with his or her major advisor. BENG 600V Master's Thesis or BENG 700V Doctoral Dissertation, as appropriate, may be used to satisfy the minimum requirements. It is Departmental policy that full-time graduate assistants (approximately

50% appointment) are limited to a maximum of 12 course hours (excluding thesis credit) per semester. This maximum may be increased to 15 hours upon recommendation of the major advisor and approval of the department head and the Dean of the Graduate School.

IV. Professional Meetings

Attendance and presenting of papers at professional meetings is strongly encouraged. The most significant contributions made by any graduate student to the department and to the major advisor involve publication of research results. However, funding must be supplied by the major advisor. Master’s students presenting papers or posters are eligible to apply for [Graduate Student Travel Grants](#). Doctoral students presenting papers or posters are eligible to apply for [Graduate Student Travel Grants](#). The Graduate School will reimburse 90% of the trip while the department is reimbursed 10% of the funds provided for the student’s expenses upon completion of travel.

Attendance at the Arkansas State Section of ASAE is expected. Permission to miss the State Section meeting is to be obtained directly from the department head.

V. Graduate Student Classifications with Work and Study Schedules

Students receiving financial support of any type from the department should check with the Departmental Administrative Manager to complete payroll and status of employment forms at the start of their employment. All Graduate-Student salary appointments in the department are on a 9-month basis with hourly employment provided through the summer at the same rate of pay. Graduate students are classified as one of the following:

Independently Supported	The independently supported graduate student receives no financial aid from the department in the form of an assistantship or salary. However, the student may be employed by the department on an hourly basis. The major advisor should approve periods of absence during the semester.
Graduate Assistants	These appointments are for half-time employment, which requires the equivalent of 20 hours per week of active research work with the remaining time being for formal study. Normally, this research will be on the thesis or dissertation subject. As a general guideline, students are expected to be in class or in their offices or laboratories during the normal workweek. Duties are to be arranged by the student and the major advisor.
Three Quarter-Time GA's	These appointments are usually available only through soft funding and require a minimum of 30 hours of work per week, which will be directed by the major advisor toward the accomplishment of specific research objectives. The student may take up to two courses per semester during the normal workweek.

The major advisor must approve periods of absence in advance.

VI. Expected Completion Time for Degrees

It is the desire of the department that students complete their degree work as quickly as possible. The Department will assist the student insofar as is consistent with the goals of quality education. The following maximum time guidelines are to be used in determining the continuance of financial support to the student.

A. M. S. Degree

Independently Supported	4 year study period
Graduate Assistants (50% appointment)	2 years at full support
Three Quarter Time Combined Appointments	3 years at full support

B. Ph.D. Degree

Independently Supported	5 year study period
Graduate Assistants (50% appointment)	3 years at full support
Three quarter Time Graduate Assistants	4 years of full support

The difference in M.S. and Ph.D. support is based on a difference in research expectations. Most graduate student positions are funded through grants and contracts commonly referred to as soft funding. Thus, continued funding is always contingent on the availability of funds.

VII. Annual Evaluation and Progress Report

Each year the Graduate Committee, assigned by the department head, in consultation with the major advisor, evaluates the progress of each graduate student with regard to individual performance and accomplishments. Early in the calendar year (usually in January) the student should schedule a time with the advisory committee to discuss the state of his or her program. The student needs to complete the graduate student progress report (Appendix C) to show the requirements met and the percentages of coursework and research completed. The major advisor will sign the form, make some comments for the annual evaluation, and write a job description that outlines the responsibilities of the student for the coming year. The Graduate Committee will review the documents and make a report to the department head. In addition, an official form called "ANNUAL GRADUATE STUDENT ACADEMIC REVIEW" is required by the Graduate School. The form must be submitted by June 30 of each year. A copy of the form may be found in Appendix C.

VIII. Research Data Records and Publications

Copies of all data, notes, calculations, sketches, letters, etc., pertaining to the student's research activities will be kept by the major advisor in a file that will remain the property of the department. This is done to insure that the department will have a complete record of the student's research activities after he or she has left the University. Thus, all entries in the file should be neat, complete and self-explanatory. Students are urged to

publish their research findings. Normally, the student will be listed as the first author. Coauthors would include the major advisor and other faculty who have made significant contributions to the reported research. The Biological and Agricultural Engineering Department reserves the right to publish these findings if a student shows no tangible evidence of seeking publication within one year after completing the thesis or dissertation. In such instances, the major advisor is considered free to list himself or herself as the senior author and has the authority to list co-authors in any order he/she deems appropriate.

IX. Office Facilities

Each graduate student will be assigned office space in Engineering Hall, if available, by the department head in accordance with percentage appointment and seniority. In some situations, the department head and/or major advisor may also assign graduate students working space at the Biological & Agricultural Engineering Research Laboratory.

X. Secretarial Services

All graduate students will have access to both computers and software suitable for word processing, graphics, etc. They will, therefore be responsible for producing all written documents needed. Under unusual circumstances, secretarial services will be approved only for work in the research area and will normally include only correspondence. This does not include the final typing of theses or dissertations in any form. Typing of special problems, laboratory reports or any other coursework is the student's responsibility. Any work sent to secretaries must be approved by the student's major advisor or supervisor. Priority for completing the approved task lies with the individual asked to do the work. If the work cannot be finished within the time required by the student, all parties involved (the student, technician, secretary, major advisor, other faculty members, etc.) should try to reach a mutually satisfactory compromise. As a last resort, the department head will make the final decision as to the scheduling priority.

XI. Drafting

It is expected that students will use computer graphics software or other methods in preparing their own graphs and drawings.

XII. Shop Work

Requests for shop work are usually related to the student's research functions and will be approved by his or her major advisor accordingly. With this approval, the major advisor must check sketches and plans to assure that there is sufficient explanation and information for proper construction. If certain items should relate to the thesis only, then the major advisor may decide that the student should do this work for himself or herself. In all cases, safety is paramount, and unsafe shop practices will not be tolerated. Before using a machine for the first time, the student is to obtain approval and instruction from the major advisor, the Research Specialist or Shop Machinist in charge. It is the responsibility of the student to seek additional assistance and instruction if necessary.

XIII. Copying

The Departmental copier is available to graduate students for materials relating to their Departmental responsibilities. The copy code for the major advisor is to be used. It is the department's policy that copying of personal class materials is not allowed. Copying of reader's and final copies of thesis and dissertations may be allowed by the major advisor in consultation with the department head, if funds have been allocated for this purpose. The student should consult the major advisor concerning interpretation of these regulations.

XIV. Computer Utilization

Usually, their major advisor, funding permitting, will furnish graduate students a computer but this is not always possible. The Department also has its own computer laboratory that maybe used on a first come, first served, basis. These computers are intended only for students of the Biological and Agricultural Engineering Department, and thus, this laboratory is always locked. The door to the laboratory is furnished with a combination lock, so that students can gain access whenever Engineering Hall is open. Students may obtain the combination from their major advisor or from the Departmental Administrative Manager. Please do not share this combination with anyone else.

The computers in the Main Office are not to be used by graduate students. Students who have special computer needs which are not met by any of the devices available to them should consult with their major advisor.

XV. Dissertation or Thesis Preparation

A dissertation or thesis based on an independent investigation of a research problem is a part of the requirements for the Ph.D. and M.S. degrees in Biological and Agricultural Engineering. The requirements concerning dissertation or thesis format can be found in the University of Arkansas Graduate School publication [Guide for Preparing Theses and Dissertations](#).

The candidate will work closely with his or her major advisor in the preparation of the thesis or dissertation. Through an iterative process of writing by the candidate, editing by the Advisor, and re-writing by the candidate, the document will be developed and polished until it is acceptable to the Advisor. Then, sufficient computer-generated copies of the completed thesis or dissertation in the prescribed form must be presented to the candidate's advisory committee for approval at least six weeks before the degree is to be conferred. Each thesis is to be judged by the examining committee on its merits as presented at the examination.

Upon acceptance of the thesis by the thesis advisory committee and at least one week before graduation, two typewritten copies of the unbound thesis in prescribed form must be delivered to the Graduate Dean for approval, along with two copies of an abstract of not more than 350 words. These copies must be delivered in a covered box, and must be accompanied by a requisition to pay for binding two of them for the department. The library will pay for binding of the other two. The Graduate Dean will be responsible for sending the approved copies to the library. All copies of the thesis must include original signatures of the student's advisory committee of record as approved and filed in the Graduate Dean's Office. Signatures of persons other than those of the official thesis director and members of the thesis advisory committee are unacceptable.

The Dean of the Graduate School will send two approved copies to the Mullins Library at least two weeks before the degree is to be conferred, together with the two copies of the abstract, approved by the major professor as suitable for publication. Additional copies for the department, major advisor and Committee must be submitted with appropriate forms to Mullins Library by the student. Please see the Departmental Secretary for details.

The student should consult the [Graduate School Catalog](#) and the Office of the [Graduate School](#) for more complete information concerning the thesis (or dissertation), its preparation and the regulations for its presentation. In general, typing is the responsibility of the student. Word processing is available on microcomputers in the Computing Room, and a conventional typewriter is available for student use in the Main Office. The Department will offer secretarial assistance for the typing of professional papers and publications only if needed because of unusual circumstances. Typing of the thesis or dissertation in any draft is the total responsibility of the student.

ACQUISITION AND UTILIZATION OF RESOURCES

The major advisor is the source of funds available for all projects for purchasing of necessary supplies, equipment and instruments for research. All purchasing requests must be approved by the student's major advisor and processed through the Departmental Accountant using the required forms. The Accountant can provide instructions on completing the forms. All receipts must be turned in to the Accountant as soon as possible.

Examples of the types of request that may be made are:

I. Requisitions

All large and/or expensive items of supplies and equipment should be ordered by this method. Students should determine their requirements well in advance of their needs, since it takes a minimum of three weeks - and typically six to eight weeks or longer - to obtain materials ordered by requisition. See the Accountant if, in an emergency situation, a requisition is required sooner. After the student determines what equipment and supplies are needed, he or she should discuss the order with the major advisor. If approved by the major advisor, proper Departmental forms should be submitted to the Accountant with the major advisor's signature. From these forms, the requisition submitted through the proper channels for approval. Forms are available from the Accountant.

II. Blanket Purchases

A blanket purchase order refers to a purchase order that covers (or blankets) miscellaneous purchases made from a particular vendor during the fiscal year. After obtaining approval for the purchase, the student should ask the major advisor if it could be purchased using a blanket purchase order. The major advisor will have a list of the blanket purchase orders for the current year for his accounts. The blanket account can be used by the student. Before going to make the purchase, the student must obtain the blanket order number from the major advisor.

III. University Bookstore/Computer Store

Many supplies may be obtained from the University Bookstore/Computer Store located in the Student Union. A catalog of the available supplies may be obtained from the Accountant. A student desiring to acquire supplies from this source should obtain approval from his or her major advisor prior to purchase. Since the department maintains blanket orders at the bookstore, an individual requisition will not be required for small purchases. The student will need to know the blanket purchase order number which may be obtained from the major advisor or the Accountant. When signing for your purchases, please sign your name followed by your major advisor's last name.

IV. Bids

There are items whose costs exceed that allowed by the University in terms of the acquisition processes discussed above. When this occurs, a bid procedure must be followed. The student should consult with the major advisor and the Accountant to obtain details associated with the bid process.

V. Petty Cash Purchases

The Department does not have a petty cash account. The student should tell the major advisor when relatively small amounts of cash are needed for supplies, and the major advisor will make the necessary

arrangements, if possible. The major advisor - not the graduate student - is responsible for supplying this source of funds. If at all possible a requisition should be processed!

VI. Travel

Travel away from the campus in connection with research projects will be approved for students when the need is justified to the major advisor, the department head, and the Director of the Agricultural Experiment Station. There are two types of travel approval that the Accountant will process:

In-State Travel	In-state travel is usually approved with a blanket travel authorization that is processed by the Accountant at the first of the fiscal year or the beginning of employment at the request of the major advisor.
Out-of-State Travel	Out-of-state travel requires a travel authorization for each individual trip. The required form must be at the office of the Director of the Agricultural Experiment Station at least ten working days prior to the trip. If this is not possible, a justification memorandum must be sent to the Director of the Agricultural Experiment Station, through the department head, explaining why the travel authorization was delayed. Travel request forms may be obtained from the Accountant. Three weeks advance notice of the proposed trip is most advisable.

In general, travel costs will be defrayed by research project funds of the major advisor. When students have completed their travel, they will need to submit a travel expense form to the Accountant in order to obtain reimbursement for expenses. Receipts need to be submitted for gasoline, airline tickets, hotels, and any miscellaneous charges such as registration, cab, etc. If the student would like to obtain an advance on their travel expenses, it has to be included in the request of the special travel. An advance cannot be given on a blanket travel. A form needs to be completed by the individual who might be requesting an advance and turned into the accountant prior to any travel advance. This advance is an agreement between the University and the student, not with the department. Forms are available from the Accountant.

In case of an accident, contact the department immediately. If you are in a University of Arkansas vehicle, specific instructions are in the glove compartment.

VII. Departmental Vehicles

Departmental vehicles are reserved exclusively for Departmental business. A sign out sheet is located in the Main Office (Room 203) for the vans that are usually parked on campus. The three pickup trucks are usually kept at the research lab, and students should coordinate the use of these two vehicles with personnel at the lab. Each vehicle contains a log-book that is to be used for trips. It is essential that logbook entries be completed for each trip, so that the proper research project can be charged for the costs. Vehicles are parked either in the yellow or blue zone across Dickson Street and south of Engineering Hall, or they are parked at the Biological & Agricultural Engineering Research Lab. Traffic and Parking tickets are the responsibility of the driver.

VIII. Long Distance Telephone Calls

If a student needs to place a long distance telephone call (for business only), the major advisor can provide his 5-digit code number or request one for the student through the Accountant. Long distance calls are placed as follows:

Enter 9, then the number to be called, including the area code. A fast busy signal will be heard. During this busy signal, the 5-digit code must be entered. Please keep the 5-digit code as a closely held secret. Long-distance calls are to be made only for official business. The telephone computer will keep track of all long-distance calls charged to each 5-digit code, and once per month you will be asked to sign a statement certifying that the calls were made on official business.

IX. FAX Machine

The FAX machine is available to students for Departmental business only and calls are to be charged to the major advisor's or student's 5-digit code if the FAX requires a long-distance call. (The telephone computer also keeps track of these calls.) It must be emphasized that the FAX machine is not for personal use. If the student needs to send or receive a FAX for personal reasons, commercial services are available.

X. Laboratories

As the student's research program develops, laboratory space will be assigned as needed. However, the major advisor must approve these space arrangements. If space is needed in areas not normally part of the major advisor's laboratory, the major advisor should consult with the department head and the Research Specialist responsible for the Agricultural Engineering Laboratory in making the necessary arrangements. Before operating major shop machines and tools or special test equipment, checkout instructions must be obtained from the staff member responsible for the laboratory areas in which the machinery or equipment is located. Safety is of primary importance, and staff members are under instructions by the department head to prohibit any unsafe operation of equipment.

XI. Special Equipment

If special equipment is needed, the student should consult with his or her major advisor for further instructions.

XII. Photographic Services

Students should record images of enough of their research facilities, equipment and developments to provide documentation for future references and presentations. If film is necessary, it may be obtained from the major advisor's blanket orders (see the Accountant for details). Developing, printing and enlarging services are available from the same sources. It is more desirable to record digital images. Students should consult with their major advisors to obtain digital cameras and graphics software.

XIII. Computing Facilities

Departmental faculty members use computers extensively in their teaching, research and extension activities. Hence, graduate students are expected to become competent in the utilization of computers as part of their educational process. The Department has extensive microcomputer capabilities. Every office and laboratory in Engineering Hall may access the Engineering and campus computer networks. Computer facilities available directly through these networks include the University of Arkansas main-frame computers and the College of Engineering Sun workstations. In addition, access to the Internet is provided. If special software is needed, the student should consult with his or her major advisor for further instructions.

XIV. Libraries

All enrolled graduate students have access to the Mullins Library on campus. One of the first things a student should do in undertaking his or her graduate program is to become familiar with the Library; that is, where it is located, what hours it is open and what special materials are maintained. Orientation sessions are frequently offered. The department also maintains copies of *Transactions of ASAE*, and *Applied Engineering in Agriculture*.

DEPARTMENTAL SOCIAL ACTIVITIES

Graduate students are encouraged to participate in Departmental social activities. These include several brown-bag lunches each year, pot-luck dinners, a Fall and Spring outing, a Christmas party and several other events associated with student activities. There is a coffee fund intended to help share the cost for those who are regular coffee drinkers. (See the Departmental Administrative Manager for details).

RECOMMENDATIONS TO GRADUATE STUDENTS

The material presented in this manual is to be used as a guide by the student. The following suggestions are offered:

1. Familiarize yourself with the [Graduate School Catalog](#) and [Graduate School Handbook](#). It represents the final authority as interpreted by the Graduate School.
2. When preparing a thesis or dissertation, check regularly and directly with the Graduate School to ensure that all regulations and policies are being followed.
3. Involve appropriate faculty in your research program and work closely with your major advisor and Advisory Committee in order to have the best possible educational experience.
4. Ask your major advisor about the possibility of attending a national meeting of ASAE. Funds may be limited, but in general, every time you receive a notice that a meeting is scheduled, you should seriously consider preparing a paper for presentation. Under most conditions, when funding is available, your major advisor will encourage you to attend and financially support your trip if you will write and present a paper on your research. Making such presentations will help you to stay focused on the objectives of your research and will guarantee that you make steady progress. In addition, you should remember that publishing the results of your research is the most important contribution you can make to the research program of your major advisor.
5. Become involved in the social and academic activities of the department and University. Become acquainted with the faculty and fellow students. Coffee break provides an excellent opportunity for getting to know everyone in the department on a personal basis. A total educational experience includes more than just taking courses and collecting data.
6. The regulations, policies and guidelines presented in the [Graduate School Catalog](#) and in this *Handbook* may seem overwhelming and restrictive at times. However, their intent is to provide the rules and serve as a guide so that a quality education may be obtained with the least possible external interference. Don't hesitate to contact the department head, major advisor, or the Graduate School, as appropriate, if you have questions or need further information or clarification concerning University or Departmental programs and policies. A checklist is available from the Departmental Administrative Manager to assist you in completing requirements and submitting forms in a timely manner.
7. Graduate school is often viewed as one of the most rewarding times in an individual's life. Hard work and taking advantage of the opportunities that are available to you will do much in preparing you for the next stage of your career. The Departmental faculty, especially your major advisor and the department head, want you to succeed and are available to help you. Good luck!

APPENDIX A

Graduate Faculty

Biological & Agricultural Engineering Faculty:

- Professors – Haggard, Kim, Li, Loewer, Matlock, VanDevender, Verma, Zhu
- Associate Professors – Costello, Osborn
- Assistant Professors – Henry, Liang, Runkle, Sadaka
- Instructors – Sullivan
- Adjunct Professors – Thoma
- Adjunct Associate Professors – Saraswat
- Adjunct Assistant Professors – Atungulu, Reba

Contact Information

Griffiths G. Atungulu	479-575-6843	atungulu@uark.edu
Tom Costello	479-575-2847	tac@uark.edu
Brian Haggard	479-575-2879	haggard@uark.edu
Christopher G. Henry	870-673-2661	cghenry@uark.edu
Jin-Woo Kim	479-575-3402	jwkim@uark.edu
Yanbin Li	479-575-2881	yanbinli@uark.edu
Yi Liang	479-575-4862	yliang@uark.edu
Otto Loewer	479-575-5118	ojl@uark.edu
Marty Matlock	479-575-2849	mmatlock@uark.edu
Scott Osborn	479-575-2877	gsosborn@uark.edu
Michele L. Reba	870-819-2708	michele.reba@ars.usda.gov
Benjami R. Runkle	479-575-2878	brrunkle@uark.edu
Dharmendra Saraswat	765-494-5013	saraswat@purdue.edu
Bailey Sullivan	479-575-4929	basulliv@uark.edu
Greg Thoma	479-575-7374	gthoma@uark.edu
Karl VanDevender	501-671-2244	kvan@uaex.edu
Lalit Verma	479-575-2351	lverma@uark.edu
Jun Zhu	479-575-2883	junzhu@uark.edu

APPENDIX B

Web Sites

Arkansas Agricultural Experiment Station
<http://aaes.uark.edu/>

Biological and Agricultural Engineering Department
<http://www.baeg.uark.edu/>

College of Engineering
<http://www.engr.uark.edu/>

Graduate School Catalog
<http://catalog.uark.edu/graduatecatalog/>

Graduate School Handbook
<http://grad.uark.edu/dean/governance/gradstudenthandbook.php>

Undergraduate Studies Catalog
<http://catalog.uark.edu/undergraduatecatalog/>

Financial Aid Office
<http://finaid.uark.edu/>

Graduate Record Exam (GRE)
<http://www.gre.org>

APPENDIX C

BAEG Department MS Candidate Progress Record

Student Name: <input style="width: 90%;" type="text"/>	Major Professor: <input style="width: 90%;" type="text"/>
--	---

Activity	Date
Initial Enrollment	
Expected Graduation	
Advisory Committee Reported to Grad School	
Thesis Title Reported to Grad School	
Course Plan Approved by Committee	
Proposal Defense Completed with Completed Rubric Submissions	
Final Examination Completed with Completed Rubric Submissions	
Manuscript as a Refereed Article Approved by the Major Professor	
Thesis to Grad School	
Exit Review by Department Head	

Annual Review

Date of Review	% Course Work Completed	% Research Completed	Date Standard Form Sent to Grad School	Is Progress Satisfactory?	Major Professor Signature

BAEG Department

PhD Candidate Progress Record

Student Name: <input style="width: 90%;" type="text"/>	Major Professor: <input style="width: 90%;" type="text"/>
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Activity	Date
Initial Enrollment	
Expected Graduation	
Declaration of Intent	
Advisory Committee Reported to Grad School	
Dissertation Title Reported to Grad School	
Course Plan Approved by Committee	
Preliminary Exam Completed with Completed Rubric Submissions	
Proposal Defense Completed with Completed Rubric Submissions	
Final Examination Completed with Completed Rubric Submissions	
Manuscript as a Refereed Article Approved by the Major Professor and Submitted.	
Dissertation to Grad School	
Exit Review by Department Head	

Annual Review

Date of Review	% Course Work Completed	% Research Completed	Date Standard Form Sent to Grad School	Major Professor Signature

ANNUAL GRADUATE STUDENT ACADEMIC REVIEW

Due date: June 30th of each year

[Completed evaluations must be submitted to the Graduate School by June 30th of each year.]

1. Student's Name
2. Student's Personal Identification Number
3. Student's Degree Program
4. Semester and year student entered degree program

5. This student (check one)

<input type="checkbox"/>
<input type="checkbox"/>
<input type="checkbox"/>

Is making satisfactory progress toward the degree.

Is not making satisfactory progress toward the degree. Please attach a statement describing the requirements for satisfactory progress that are not being met by this student. Explain how satisfactory progress toward the degree can be regained.

Has been dismissed from the program because of unsatisfactory progress toward the degree. Please attach a statement explaining why the student was dismissed.

6. The results of the review were communicated to the student:

a) By face-to-face interview on (date) _____

Signature of Student _____

b) By the following procedure because the face-to-face interview was not possible or practical (include dates of notification): _____

7. This form accurately summarizes the annual graduate student academic review for this student for (academic year): _____

Signature of Review Coordinator

Name of Review Coordinator

Signature of Department Head/Chair

Date

FOR GRADUATE SCHOOL USE ONLY:

Review received (signature of dean): _____

Revised: 06/2006

M.S. in Biological Engineering

The following describes the general M.S. degree requirements:

1. Not less than 24 semester hours of coursework acceptable to the committee.
2. A minimum of six semester hours of thesis (BENG 600V).
3. No grade lower than "C" on graduate coursework.
4. Selection of graduate committee and preparation of written Program of Study within the first semester.
5. Earn a minimum cumulative grade-point average of 3.0 on all graduate courses attempted and continued good standing with the Graduate School.
6. Satisfactorily pass a written thesis proposal defense.
7. Satisfactorily pass a final comprehensive oral examination and complete and submit a dissertation.
8. Timely submission of the completed evaluation rubrics for the proposal defense and final examinations. See Evaluation Rubrics in Appendix C.
9. Preparation of a paper suitable for submission as a refereed article from research done for a thesis. It is not required that the paper be submitted for publication, but it must be prepared and approved by the major professor.
10. Completion of Exit Review.

Degree Checklists

Master of Science in Biological Engineering Requirements

All Master of Science in Biological Engineering (M.S.BENG) degree candidates, regardless of previous degree status, must demonstrate completion of the Basic Engineering Education and Engineering Breadth requirements listed below. Candidates who do not possess a degree from a program accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology (ABET) must also satisfy the basic level ABET accreditation requirements. These include completion of no less than 48 credit hours of approved engineering topics and demonstrating, to the satisfaction of the student's graduate study committee, that he/she possesses those abilities and characteristics required of graduates from ABET accredited engineering programs. This shall include the completion of a course that concentrates on a major design project and that results in the production of a design report or other design product as appropriate. The design project must build on and require engineering knowledge and skills from previous coursework and must incorporate engineering standards and realistic constraints. The course selected to satisfy this requirement is subject to the approval of the student's graduate study committee. Exceptions to these degree requirements may be requested by means of a petition outlining the reasons for the exceptions and presenting an alternate plan for completing the program. The petition shall be subject to the approval of the student's graduate study committee and the Program Director and department head. Credit for courses taken at another institution is subject to the approval of the Program Director and department head. In particular, advanced engineering courses (3000, 4000, and 5000-level at the University of Arkansas) normally will not be accepted for transfer from institutions or degree programs that are not accredited by ABET.

At least 18 of the 30+ credit hours presented for the M.S.BENG must be 5000-level or higher, and the cumulative grade-point average on all graduate courses presented for the degree must be at least 3.00. The cumulative grade-point average on the basic engineering education and biological engineering breadth courses must be at least 2.70.

Candidates for the degree must pass a thesis proposal defense to define their research program and a comprehensive final examination that will include either a defense of the candidate's thesis or a presentation and discussion of the candidate's Master's Report. The examination is to be prepared and administered by the student's graduate adviser.

A checklist to assist the student and advisor to make sure all requirements have been met follows.

TOTAL HOURS OF ENGINEERING TOPICS

(Basic Engineering [I.d.] + Breadth [II] + Graduate Engineering Courses [III])
(Minimum course work of 48 hours of engineering topics required)

TOTAL HOURS OF GRADUATE COURSE WORK

(Must be at least 30 = IIIa + IIIb)

TOTAL HOURS OF 5000 LEVEL OR ABOVE BENG

COURSE WORK (Must be at least 10 excluding thesis hours)

TOTAL HOURS AT 5000 LEVEL OR ABOVE

(Must be at least 12 excluding thesis hours)

Thesis option – Thesis Title: _____

Thesis Approved _____ (Thesis advisor)

Journal Manuscript Approved _____ (Thesis Advisor)

Approved for degree: _____
Chair of Biological Engineering Studies

EVALUATION RUBRIC: THESIS PROPOSAL EVALUATION

Student name: _____

Student ID: _____

Completed by: _____

Date: _____

I/The student am/is prepared to plan a thesis research based upon:	Strongly agree = 1	Agree = 2	Neither agree nor disagree = 3	Disagree = 4	Strongly disagree = 5	N/A
(a) Comprehension of the relevant literature						
(b) Design and application of research methods and/or tools to solve research problem						
(c) Analysis and support for generalizations or generation of alternative solutions						
(d) Evaluation and validation						
(e) Effective oral communication skills						
(f) Effective written communication skills						
Overall judgment						
Comments:						

- This evaluation rubric serves as a model for a “tool” that can be used by the student’s advisory committee both as they prepare their students to meet program goals and SLO-2 and as they report on their success in required assessment reports. Details can be adjusted or fine-tuned by the Major Professors in consultation with advisory committee members to meet the nature of the student’s area of research. Desired level of achievement on the evaluation rubric is “agree or strongly agree, *i.e.*, ≤ 2 ”.
- **Instructions:**
 1. Major Professors, advisory committee members, and students should review and become familiar with the criteria in the evaluation tool, as a guide, prior to the preparation of a thesis research proposal.
 2. The rubric should be scored both by the Major Professors and advisory committee members and by the students at the time the first complete draft of the proposal is submitted.
 3. The feedback provided by the scored rubrics should be discussed directly with the student.
 4. The completed rubrics should be delivered to the Graduate Coordinator (or Department Head) for use as a valuable tool in graduate student learning outcomes assessment.
 5. The student should keep the rubric page(s) as feedback for thesis proposal development.

EVALUATION RUBRIC: THESIS DEFENSE

Student name: _____

Student ID: _____

Completed by: _____

Date: _____

I/The student write(s) a thesis based upon:	Strongly agree = 1	Agree = 2	Neither agree nor disagree = 3	Disagree = 4	Strongly disagree = 5	N/A
(a) Comprehension of the relevant literature						
(b) Design and application of research methods and/or tools to solve research problem						
(c) Analysis and support for generalizations or generation of alternative solutions						
(d) Evaluation and validation						
(e) Effective oral communication skills						
(f) Effective written communication skills						
Overall judgment						
Comments:						

- This evaluation rubric serves as a model for a “tool” that can be used by the student’s advisory committee both as they prepare their students to meet program goals and SLO-3 and as they report on their success in required assessment reports. Details can be adjusted or fine-tuned by the Major Professors in consultation with advisory committee members to meet the nature of the student’s area of research. Desired level of achievement on the evaluation rubric is “agree or strongly agree, *i.e.*, ≤ 2”.
- **Instructions:**
 1. Major Professors, advisory committee members, and students should review and become familiar with the criteria in the evaluation tool, as a guide, prior to the preparation of a thesis defense.
 2. The rubric should be scored both by the Major Professors and advisory committee members and by the students at the time the thesis defense is completed.
 3. The feedback provided by the scored rubrics should be discussed directly with the student.
 4. The completed rubrics should be delivered to the Graduate Coordinator (or department head) for use as a valuable tool in graduate student learning outcomes assessment.
 5. The student should keep the rubric page(s) as feedback for thesis development.

PhD in Engineering

The PhD program is supervised by the Graduate School and administered by the College of Engineering. Students and Advisors must carefully follow the policies of the College of Engineering described below, and the requirements of the Graduate School in the following document: [Procedures for Doctoral Degrees](#).

In addition to the requirements of the Graduate School, the following requirements have been established by the College of Engineering for all doctoral graduates:

1. All students must meet complete a minimum of 78 semester hours of graduate-level credit beyond the engineering bachelor's degree, including a minimum of 48 semester hours of course work and a minimum of 30 semester hours of dissertation research credits.
2. A minimum of 30 semester hours of course work must be at the graduate level (5000 or above).
3. Upon recommendation of the student's advisory committee, a student who has entered the Ph.D. program after a master's degree in engineering may receive credit for up to 30 semester hours. If the 30 hours includes master's thesis research, the advisory committee may credit up to 6 hours of thesis research toward the minimum dissertation research requirement.
4. Complete a minimum of nine semester credit hours of coursework in a set of coherent courses in a related subject area approved by the student's advisory committee.
5. Earn a minimum cumulative grade-point average of 3.0 on all graduate courses attempted and continued good standing with the Graduate School.
6. Satisfactorily pass both a preliminary examination
7. Satisfactorily pass both a written and oral dissertation proposal defense.
8. Satisfactorily pass a final comprehensive oral examination and complete and submit a dissertation.
9. Timely submission of the completed evaluation rubrics for the preliminary examination, proposal defense and final examinations. See Evaluation Rubrics in Appendix C.
10. Preparation of a paper suitable for submission as a refereed article from research done for a dissertation. It is not required that the paper be accepted for publication, but it must be approved by the major professor and be submitted.
11. Completion of Exit Review.

EVALUATION RUBRIC: PRELIMINARY EXAMINATION

Student name: _____

Student ID: _____

Completed by: _____

Date: _____

I/The student am/is prepared for independent research based upon:	Strongly agree = 1	Agree = 2	Neither agree nor disagree = 3	Disagree = 4	Strongly disagree = 5	N/A
(a) Comprehension of the relevant literature						
(b) Design and application of research methods and/or tools to solve research problem						
(c) Analysis and support for generalizations or generation of alternative solutions						
(d) Evaluation and validation						
(e) Effective oral communication skills						
(f) Effective written communication skills						
Overall judgment						
Comments:						

- This evaluation rubric serves as a model for a “tool” that can be used by the student’s advisory committee both as they prepare their students to meet program goals and SLO-2 and as they report on their success in required assessment reports. Details can be adjusted or fine-tuned by the Major Professors in consultation with advisory committee members to meet the nature of the student’s area of research. Desired level of achievement on the evaluation rubric is “agree or strongly agree, *i.e.*, ≤ 2”.
- **Instructions:**
 1. Major Professors, advisory committee members, and students should review and become familiar with the criteria in the evaluation tool, as a guide, prior to the preparation of a preliminary exam.
 2. The rubric should be scored both by the Major Professors and advisory committee members and by the students at the time the preliminary exam is completed.
 3. The feedback provided by the scored rubrics should be discussed directly with the student.
 4. The completed rubrics should be delivered to the Graduate Coordinator (or Department Head) for use as a valuable tool in graduate student learning outcomes assessment
 5. The student should keep the rubric page(s) as feedback for dissertation research development.

EVALUATION RUBRIC: DISSERTATION PROPOSAL EVALUATION

Student name: _____

Student ID: _____

Completed by: _____

Date: _____

I/The student am/is prepared for contributing new knowledge based upon:	Strongly agree = 1	Agree = 2	Neither agree nor disagree = 3	Disagree = 4	Strongly disagree = 5	N/A
(a) Comprehension of the relevant literature						
(b) Design and application of research methods and/or tools to solve research problem						
(c) Analysis and support for generalizations or generation of alternative solutions						
(d) Evaluation and validation						
(e) Effective oral communication skills						
(f) Effective written communication skills						
Overall judgment						
Comments:						

- This evaluation rubric serves as a model for a “tool” that can be used by the student’s advisory committee both as they prepare their students to meet program goals and SLO-3 and as they report on their success in required assessment reports. Details can be adjusted or fine-tuned by the Major Professors in consultation with advisory committee members to meet the nature of the student’s area of research. Desired level of achievement on the evaluation rubric is “agree or strongly agree, *i.e.*, ≤ 2 ”.
- **Instructions:**
 1. Major Professors, advisory committee members, and students should review and become familiar with the criteria in the evaluation tool, as a guide, prior to the preparation of a dissertation research proposal.
 2. The rubrics should be scored both by the Major Professors and advisory committee members and by the students at the time the first complete draft of the proposal is submitted.
 3. The feedback provided by the scored rubrics should be discussed directly with the student.
 4. The completed rubrics should be delivered to the Graduate Coordinator (or Department Head) for use as a valuable tool in graduate student learning outcomes assessment.
 5. The student should keep the rubric page(s) as feedback for dissertation proposal development.

EVALUATION RUBRIC: FINAL EXAMINATION

Student name: _____

Student ID: _____

Completed by: _____

Date: _____

I/The student contribute(s) new knowledge based upon:	Strongly agree = 1	Agree = 2	Neither agree nor disagree = 3	Disagree = 4	Strongly disagree = 5	N/A
(a) Comprehension of the relevant literature						
(b) Design and application of research methods and/or tools to solve research problem						
(c) Analysis and support for generalizations or generation of alternative solutions						
(d) Evaluation and validation						
(e) Effective oral communication skills						
(f) Effective written communication skills						
Overall judgment						
Comments:						

- This evaluation rubric serves as a model for a “tool” that can be used by the student’s advisory committee both as they prepare their students to meet program goals and SLO-4 and as they report on their success in required assessment reports. Details can be adjusted or fine-tuned by the Major Professors in consultation with advisory committee members to meet the nature of the student’s area of research. Desired level of achievement on the evaluation rubric is “agree or strongly agree, *i.e.*, ≤ 2”.
- **Instructions:**
 1. Major Professors, advisory committee members, and students should review and become familiar with the criteria in the evaluation tool, as a guide, prior to the preparation of a final exam (*i.e.*, final dissertation defense).
 2. The rubrics should be scored both by the Major Professors and advisory committee members and by the students at the time the final exam is completed.
 3. The feedback provided by the scored rubrics should be discussed directly with the student.
 4. The completed rubrics should be delivered to the Graduate Coordinator (or Department Head) for use as a valuable tool in graduate student learning outcomes assessment
 5. The student should keep the rubric page(s) as feedback for dissertation development.