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Agricultural and Biosystems Engineering Department Graduate Student Guide

2004-2005 Academic Year

Graduate Student Policies, Procedures, and Requirements



AGRICULTURAL AND BIOSYSTEMS ENGINEERING (ABE) GRADUATE STUDENT GUIDE

GRADUATE STUDENT POLICIES, PROCEDURES, AND REQUIREMENTS

AGRICULTURAL AND BIOSYSTEMS ENGINEERING DEPARTMENT

The graduate study information in the following pages is taken, in part, from the Office and Procedure Guide of the University, the Graduate College Handbook, and the ISU Information Student Handbook. To find web sites containing these handbooks, forms, and other information, go to: <http://www.iastate.edu/> or <http://www.grad-college.iastate.edu/>. Additional guidelines were added to define ABE Departmental requirements.

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I. SELECTION OF MAJOR PROFESSOR AND THESIS/DISSERTATION PROJECT

A. Initial assignment of a student to an advisor

Generally students are admitted only if a member of the ABE Department Graduate Faculty agrees to serve as the student's major professor. However, if a graduate student is admitted but a choice is not made, the student will be assigned to a faculty advisor who is a member of the graduate faculty. Whether or not the advisor later becomes the student's major professor depends on the student's area of interest. It is important that the student determine the area in which he or she wishes to specialize as soon as possible. Major professors can be changed, but to plan a Program of Study (POS) wisely, the student should reach a decision very soon on a major professor and a main area of interest. As a general rule, the student has the freedom and responsibility of choosing a major professor. The student should realize, however, that there are constraints:

1. The intended major professor should have current or recent research directly related to the student's interest.
2. Addition of the student to the major professor's group would not prejudice the quality of supervision that this or other students would receive.
3. The major professor has the option not to accept a student who would require an inordinate amount of remedial coursework before the student could become a productive member of the research group.

(For further constraints see subsection I. D.)

If for any reason the student wishes to change major professors, this should be discussed with the major professor or the Department Chair. All faculty want to assist the student in developing a program that will be of benefit to the student and the Department.

B. Duties of the major professor

1. To guide the student in choosing a POS committee (to be done during the first semester in residence).
2. To guide the student in developing a POS (to be done in the first (M.S.) or second (Ph.D.) semester in residence).
3. To supervise the student's research work, thesis/dissertation, thesis/dissertation research publication, and professional development.

C. Duties of the student

The student should immediately review the "Graduate College Handbook" available on line (www.iastate.edu) through the graduate college publications links. This handbook explains in detail the procedures for preclassification, registration, development of the POS, English requirement, and other pertinent details. **IT IS THE STUDENT'S RESPONSIBILITY TO SEE THAT ALL DEADLINES AND REQUIREMENTS ARE MET.**

D. Choice of thesis project

An attempt is made to allow research on a problem of the student's own choosing; however, available funds, available time, limitations of the student, and limitations due to the availability of equipment and other resources may restrict the choice of a project.

Departmental research funds are dedicated for use in specific subject areas. As a result, graduate students who are accepting support from the Department may be required to do work in a specific area.

II. TYPES OF APPOINTMENT¹²

Each student's program is an individual endeavor and the requirements and needs of the program depend upon the student's appointment and type of support. There are different appointments as follows:

A. Full-time student--own support

This student can register for a maximum of 15 credits per semester (9 credits for the summer session) with no employment responsibility to the Department. The student is responsible to his or her major professor for fulfilling program requirements and for participating in activities designed for his or her professional development.

B. Full-time student--supported by another university, foundation, or government agency

This student can register for a maximum of 15 credits per semester (9 credits for the summer session). When planning the POS, the student and the major professor are obligated to see that the objectives as set forth in the sponsoring agency's program are met.

C. Associate or instructor

This student has a salaried (B or D base) appointment with the university, with his or her primary obligation in teaching and/or research. A full-time associate or instructor is permitted to carry 6 credits per semester (3 credits for the summer session). The student is responsible to the student's major professor for the POS and usually for his or her duties as a university employee. A 3/4-time appointment in this category allows the student to enroll for 9 credits per semester (5 credits for the summer session); a half-time appointment, 12 credits per semester (7 credits for the summer session). This appointment does not include reductions for tuition but does carry greater flexibility in salary and benefits.

¹The terminology used by the University is:

A-base 12 month appointment

B-base 9 month appointment

C-base (graduate assistant) research 12 month and teaching 9 month

D-base (pre-doctoral associate) 12 month

D-base (post-doctoral associate) 12 month

² Only 1/4, 1/2, and 3/4 time appointments are mentioned specifically in this section. Part year and fractional time appointments are made as research needs and funding dictate. The information given in this section relating to coursework loads should be scaled according to the appointment. Personnel on nonstandard appointments are advised to consult with their major professors concerning allowable course loads.

D. Graduate assistant

This student has a C-base, 1/2-time appointment and is obligated to the Department for this time (approximately 20 hours per week). The student will pay for 12 credits per semester (7 credits for the summer session), regardless of actual credits taken.

Under some circumstances, a teaching or research assistant may be appointed for 1/4- or 3/4-time. On 1/4-time, the student is permitted to enroll for 15 credits per semester (9 credits for the summer session); on 3/4-time the student is permitted to enroll for 9 credits per semester (5 credits for the summer session).

Full-time C-base appointments are permitted for 3 months per year (during the summer only).

A graduate teaching assistant is a 9-month appointment with teaching duties. There is no assurance of summer employment. The graduate assistant is assigned to a faculty member for teaching duties.

A graduate research assistant is a 12-month appointment, with research duties. The graduate assistant is responsible to a faculty member (normally the student's major professor) for research duties and is responsible to his or her major professor for the POS. If support for an assistantship is from a funded research project, the student is encouraged and may be required to select a thesis problem that is within the scope of the project.

E. Tax status

All associates, instructors, and graduate assistants should assume that their stipends are liable to both federal and state taxes. The individual is responsible for ascertaining his or her particular tax status. Further information on the tax liabilities of graduate students may be obtained from the Graduate Student Senate (G44 Memorial Union, 294-8725).

III. SICK LEAVE AND VACATION POLICIES

The State Auditor's Office requires the Department to maintain a record of all vacation and sick leave for each employee. Therefore, absence request cards should be submitted before leave is taken. These are available from the Departmental Office. In case of absence due to sickness, the cards should be submitted the first day upon returning to work.

A. Sick leave

Sick leave accumulates at a rate dependent upon the fraction of time worked. Full-time employees are granted 12 working hours a month. C-base employees on 3/4-time are granted 9 hours a month; 1/2 time employees are granted 6 hours a month, etc. Evidence may be requested in order to be granted sick leave.

B. Vacation

1. D-base associates earn 2 working days vacation per month. Such vacation should be taken **AFTER CONSULTATION WITH THE MAJOR PROFESSOR AND IMMEDIATE SUPERIOR**. Absence request cards should be completed before taking vacation. Fractional appointments earn proportionally less vacation time.

2. B-base instructors do not earn vacation but are permitted such when students are not in residence. Instructor's appointments extend from about August 20 to May 20, unless such appointments are for less than 9 months.
3. C-base graduate assistants earn 2 working days (8 hours on 1/2-time; 12 hours on 3/4-time; and 4-hours on 1/4time) vacation per month. Such vacation should be taken **AFTER CONSULTATION WITH THE MAJOR PROFESSOR OR PROJECT LEADER**. Absence request cards should be completed before taking vacation. Vacation may be carried over from one year to the next during continuous appointment, but all accrued vacation must be taken before termination of appointment (i.e. no pay for terminal leave is given).
4. All university employees and persons supported by research grants administered through the university should be aware that absence from campus during working hours is considered vacation. The term "working hours" is capable of flexible interpretation for a graduate student, but care should be taken to not abuse this policy.

IV. UNIVERSITY-APPROVED TRAVEL

When travel is for the benefit of the university, travel expenses may be reimbursed subject to the availability of funds.

- A. Expenses for out-of-state travel can only be paid if a travel request has been approved by the Major Professor, Department Head, and other university officials. This request should be submitted **AT LEAST 15 DAYS** before the departure, unless there are extenuating circumstances. To be reimbursed for expenses, a travel expense voucher must be submitted, along with receipts for everything except meals (see office procedure guide for cost limits on meals). When a personal car is used, a record of miles traveled must be included. The student should ask his or her major professor for details when traveling for the first time.
- B. Graduate Students are eligible and are encouraged to apply for travel mini-grants from the Graduate College. These should be applied for 8-10 weeks before departure. Forms are available on the graduate college web page.
- C. A travel request is not needed for in-state travel. The student should first check with his or her major professor, however.
- D. **IF A UNIVERSITY CAR IS TO BE USED, IT MUST NOT BE USED FOR PERSONAL PURPOSES. THERE ARE SEVERE PENALTIES FOR INFRACTIONS OF THIS STATE OF IOWA LAW.** In addition, careful attention must be paid to traffic regulations (e.g., speed limits). All drivers must have a valid Iowa Drivers License.

V. USE OF DEPARTMENTAL FACILITIES

- A. The Department has a secretarial staff whose services are assigned to faculty. If the instructor requires the student to have material prepared by the secretarial staff, the instructor will submit it personally to the secretaries.

Student-authored technical articles to be submitted to refereed journals or as portions of project reports can be prepared by department secretaries, when submitted by the major professor. These articles may also appear in alternate-format theses. However, students should prepare first drafts of their own manuscripts, according to the appropriate style manual.

- B. The Department maintains a computer laboratory with word-processing, spreadsheet, drafting, and other software. The computer facilities serve both undergraduate and graduate students. Graduate students may use the facilities except during scheduled class periods. There is also a Departmental copy machine; operation of this machine requires a code number. Permission of the major professor is required before any copying is done. Inappropriate use of this equipment (e.g. copying a textbook, developing a personal library of journal articles, or copying coursework) is not permitted. PLEASE NOTE THAT IT IS STATE POLICY THAT UNIVERSITY EQUIPMENT SHALL NOT BE USED FOR PERSONAL USE.

It is important that each person help maintain the equipment and maintain security by observing rules for locking equipment room doors.

It is not ethical to make copies of another person's copyrighted work in such a manner that the author forfeits his/her just compensation. Copying whole books or commercial software can be both unethical and illegal.

VI. MINIMUM UNDERGRADUATE REQUIREMENTS

Table 1 gives the requirements to be met by students wanting to be admitted to work for the M.S. or Ph.D. degrees. International (non-English speaking) students need to score = 550 (paper-based test) or = 213 (computer-based test) on the Test of English as a Foreign Language (TOEFL). The Graduate Record Exam (GRE) is required for all students.

Table 1. Minimum standards for admission for graduate study in Agricultural Engineering

Full admission

- BS degree in Engineering
- 3.0 undergraduate grade-point average (4.0 scale)

Provisional admission

- BS degree, non-engineering
 - 11 semester credits in math (through differential equations)
 - 16 semester credits in basic sciences
 - undergraduate grade-point average (4.0 scale)
-

Students who are admitted to the Agricultural Engineering Graduate Program without a B.S. in an engineering discipline are required to complete the coursework described in Table 2 before they can transition from provisional to full admission status. These required courses in engineering sciences and agricultural engineering applications, when combined with the other graduate degree requirements, are intended to provide the fundamental engineering knowledge needed for professional practice as an agricultural engineer. However, it is important to note that professional engineering (P.E.) registration is a separate process from a graduate degree, and the prerequisite qualifications for registration without an accredited B.S. in engineering vary among state licensing boards. Students with the advice of their Program Of Study (P.O.S.) committee are responsible for ensuring that the P.O.S. meets both general departmental requirements and the particular student's career goals.

Table 2. Course work to be completed before receiving full admission status.

-----Engineering Sciences-----		Agricultural Engineering Applications
<u>required courses^a</u>	<u>supporting courses^b</u>	
statics	dynamics	electrical/electronics
mechanics of materials	heat transfer	psychrometrics
	Fluids	soil and water
	thermodynamics	power and machinery
		structures and environment
		food and bioprocessing

^acourses must be taken for credit with a minimum grade point average of 3.0

^btwo of these four

^cone or more courses from at least three of these six areas (300 level or above)

VII. MINIMUM REQUIREMENTS FOR AGRICULTURAL ENGINEERING GRADUATE DEGREE PROGRAMS³

The courses specified on a POS go through three stages of review:

1. The student's POS committee.
2. The Department Chair.
3. The Graduate College.

Students should note that their (POS) form should be processed in the above sequence and ONLY in that sequence. All the stages of review are OBLIGATORY for Agricultural and Biosystems Engineering students. The University requires signatures on the POS form for all steps.

Program of Study (POS) review policy:

- a. The POS committee has primary responsibility for the content of Programs of Study.
- b. The POS committee should meet to discuss and approve a proposed program. This form will detail the courses used to meet Departmental and University requirements and will show explicitly the necessary calculations (see Appendix A for the form).
- c. The student will be required in the first year of study to prepare a short summary of his/her proposed research project, for approval by the POS committee, and subsequent circulation (for information purposes) in the Department. The chair of the Department Graduate Faculty will collect these summaries.

³ Most programs exceed these minima in one or more categories. For students on C-base appointments, registration for research credits must continue until the final oral has been completed. The major professor may require registration for more research credits than the number shown on the POS, e.g. during the semester in which the thesis is being written. Research credits beyond those required on the POS will be taken S-F.

A. Master of Science (with thesis):

1. A minimum of 30 graduate⁴ credits as follows:
 - a. AE 661.
 - b. Two 500 or 600 level Agricultural Engineering courses. Neither AE 590 nor AE 598 nor AE 661 can be used to meet this requirement.
 - c. Eighteen credits from no more than three departments (including Agricultural and Biosystems Engineering).
 - d. A minimum of 3 credits of coursework in another department in the College of Engineering, excluding seminars.
 - e. A minimum of 22 coursework credits.
 - f. At least 6 credits of research, AE 699.
 - g. AE 598 (1 credit), but not counted as coursework.
 - h. A course in mathematics (see XIV) or a course in statistics (Stat 401 or 402).

B. Master of Engineering

1. A minimum of 31 graduate⁴ credits as follows:
 - a. AE 661.
 - b. Three 500- or 600-level Agricultural Engineering courses. Neither AE 590 nor AE 598 nor 661 can be used to meet this requirement.
 - c. Twenty credits from no more than three departments (including Agricultural and Biosystems Engineering).
 - d. A minimum of 3 credits of coursework in another department in the College of Engineering, excluding seminars.
 - e. A minimum of 27 coursework credits.
 - f. At least 4 credits of creative component research, AE 599.
 - g. A course in mathematics (see XIV) or a course in statistics (Stat 401 or 402).

C. Doctor of Philosophy

1. A minimum of 72 graduate⁴ credits as follows:
 - a. AE 661.
 - b. Four 500- or 600-level Agricultural Engineering courses. Neither AE 590 nor AE 698 nor AE 661 can be used to meet this requirement.
 - c. A declared co-major, a declared minor, or 14 credits of major and non-major graduate coursework from a single department, other than Agricultural and Biosystems Engineering.
 - d. A minimum of 9 credits in other engineering departments in the College of Engineering as specified by the student's program-of-study committee, excluding seminars.
 - e. A minimum of 42 coursework credits beyond the B.S. degree.
 - f. AE 698 (1 credit), classified as X, but not to count as coursework.
 - g. At least 12 credits of research, AE 699.

⁴Undergraduate-level courses are sometimes required of graduate students to make up deficiencies in undergraduate background. Such courses appear on transcripts and are included in the determination of the grade point average. These courses may not be taken on a pass/not pass (P/PN) basis.

- h. Three courses in mathematics (see XIV) and/or statistics (401 or higher; at least one of the three courses must be statistics).
2. A teaching-extension experience (see X.I) approved by the Department Graduate Faculty.

VIII. THESIS/DISSERTATION RESEARCH PUBLICATION, AE 598 and 698

Prompt publication of thesis research in a refereed journal and/or a patent application is the objective of research projects in the ABE Department.

A refereed journal is a periodical, which solicits original (not previously published) research papers, sends them out for peer review, and, if recommended by the peer reviewers, publishes the paper (likely after some revision) in the journal. Publication in a refereed journal gives others maximum accessibility to your research results.

Refereed publications and patents are likely to be one of the criteria by which students are judged as they seek employment.

Responsibility for publication rests with the graduate student and major professor. The graduate student should generally be listed as the first author. (see below).

Since experience in the procedures of publishing research results is an important part of graduate education, every

All M.S. and Ph.D. students in the Agricultural and Biosystems Engineering Department are required to complete one credit of AE 598 (M.S.) or AE 698 (Ph.D.) for each degree acquired at Iowa State University. During the last semester of their program, students should register for 1 credit of AE 598 or 698, as appropriate. This course will be graded on a Satisfactory - Fail (S - F) basis. To complete requirements for the course, a student must prepare at least one technical paper based on thesis/dissertation research, ready for submission to a refereed journal (as determined in consultation with the student's major professor) and must present a seminar to the Department faculty; presentation at a regional or national professional meeting is an acceptable substitute for the Departmental seminar. A satisfactory (S) grade will be assigned when the presentation is made and a paper is prepared for submission to a peer review journal.

Major revisions to the manuscript following peer review will be the responsibility of the graduate student, if he or she wishes to retain first-author status. Otherwise the major professor or one of the other authors may assume first-author status and proceed with publication. The graduate student will be listed among the authors in a place deemed appropriate by the major professor.

CREDIT IN AE 598 and/or AE 698 IS REQUIRED OF ALL MS and PHD STUDENTS. AE 598 and AE 698 credits count toward the departmental requirements for research (AE 699) credits, but are not coursework credits.

IX. MINIMUM REQUIREMENTS FOR MINORS OR INTERDEPARTMENTAL PROGRAMS

- A. Agricultural Engineering minor for a Ph.D. program shall include:
1. A minimum of 12 credits from engineering departments, exclusive of the student's major department, with a minimum of 6 of those from the Agricultural and Biosystems Engineering Department (including at least one 500- or 600-level course, but excluding AE 590).
 2. Satisfactory completion of a one-day, open-book written preliminary examination administered by the minor representative on the POS committee.
- B. Agricultural Systems Technology (AST) minor for a Ph.D. program shall include:
1. Completion of at least 4 credits of college level mathematics courses having principal emphasis in algebra, trigonometry, or analytic geometry. Courses in statistics, probability, or mathematical ideas are not suitable.
 2. At least 12 credits of graduate work approved by the Graduate Programs Committee. These 12 credits must include at least 6 credits of AST courses listed as for minor graduate credit. The remaining credits may include AST independent study (AST 490) and up to 3 credits in Industrial Education and Technology.
 3. Satisfactory completion of a written preliminary examination administered by the minor representative on the POS committee.
- C. Environmental Sciences and Toxicology programs for a M.S. and a Ph.D. program shall include:
1. Completion of AE 698 and AE 598 (Thesis/Dissertation Research Publication), respectively.
 2. Completion of a teaching-extension experience (see X.I).

X. ADDITIONAL REQUIREMENTS AND INFORMATION

- A. Remedial courses required by the English Department shall be taken for a grade.
- B. Remedial computer programming courses shall be taken for a grade.
- C. Special Topics coursework listed on the POS shall have the subject matter specified.
- D. Tenure of appointment - for students on appointment (see pages 2-3 for appointment definitions) satisfactory completion of one appointment (usually one year), plus satisfactory academic performance, will ordinarily make a student eligible for

reappointment. Appointments are reviewed annually by the major professor. Students who do not make sufficient academic or research progress will be notified two months in advance of the decision to not reappoint them. Graduate College rules state that after a period of three years of study for a Master's degree or five years for the Doctorate, the student may be continued on assistantship support only with prior approval of the Graduate Dean (see Section IX for Departmental Guidelines).

- E. Students enrolled in a Ph.D. program will be examined by their POS Committee via at least two written exams⁵ that shall take place within a two-week period. The written exams will precede the oral prelim exam.
- F. Agricultural Engineering minors will take a closed-book, 3-hour written preliminary exam over subject matter taken from Agricultural Engineering courses included in the minor.
- G. Courses that carry minor graduate credit, (excepting those in the Agricultural and Biosystems Engineering Department) may be included on the POS only when the POS Committee has determined that the material is substantially different from courses appearing on the student's undergraduate transcript. Those 400-level courses that are normally taken by ISU Agricultural Engineering undergraduates as part of their prescribed curriculum may not be taken for minor credit.
- H. Prior to graduation approval, students will provide two final copies of their thesis or dissertation (one for the department, one for the major professor), in addition to those required by the library.
- I. A teaching-extension (T/E) experience, whose purpose is to provide graduate students administered in the Agricultural and Biosystems Engineering Department with an opportunity to work with groups in an instructional situation, is required. To fulfill this requirement students will need to complete a T/E project under the supervision of a faculty member. T/E projects should take, on average, about 12 hours of time to complete. T/E projects will be described on the requirement form submitted with the Program of Study and will be approved by the POS Committee.

Some examples of T/E projects might be:

- Preparation and delivery of 2-3 classroom lectures.
- Preparation, delivery, and grading of 1-2 laboratory exercises.
- Preparing and delivering a specific program.
- Writing an ISU Extension public information bulletin.
- Assisting in development of a Conference.

⁵ An oral examination conducted by the POS committee is the minimum University requirement for a preliminary examination. The requirements outlined in this section are in addition to the oral examination and not in place of it.

The T/E experience is intended to strengthen the student's communication abilities. It is not intended to substitute for faculty or graduate student teaching responsibilities. Graduate students on teaching appointments for at least one semester will be considered to meet the T/E requirement.

XI. GRADUATE STUDENT PROGRESS

Graduate students should make reasonable progress on their degree programs. Efficient use of funds and time, as well as the student's stature in his or her profession, are sufficient reasons to give this attention. A STUDENT ENROLLED FOR AN ADVANCED DEGREE SHOULD RECOGNIZE THAT BEING A CANDIDATE AND RECEIVING A DEGREE ARE NOT SYNONYMOUS. The award of an advanced degree is contingent upon sound academic performance in coursework, demonstrating the ability to conduct independent research, and passing any preliminary and final exams.

Table 3 contains the progress expectations for M.S. and Ph.D. candidates. If a special case is encountered, the major professor and the student must provide a written request with justification, three months in advance for extension of support. This request must be approved by the Department Chair and the chair of the Graduate Program Committee.

Table 3. Graduate Student Progress Guidelines^a (in years from enrollment)
Continuous appointment percentage^b

Degree	Event	Continuous appointment percentage ^b 50% or less	More than 50%
M.S.	P.O.S. and thesis completed	2	3
Ph.D.	Preliminary exams	2 ^c	3 ^c
	P.O.S. and dissertation completed	3 ^c	4 ^c

^aApplicable to all students **administered** in Agricultural and Biosystems Engineering. (e.g. General Graduate Studies, W. Res., FSHN, etc.); these guidelines are used for termination of support (if prior Graduate Program Committee approval for extension has not been obtained).

^bAll employment bases, averaged over a given year.

^cYears after MS.

A database of student progress is maintained as an aid in administering these guidelines.

- A. ISU M.S. students who desire to pursue the Ph.D. at ISU will have their M.S. program reviewed by the Graduate Program Committee. The Committee will decide whether or not the student should be allowed to enter a Ph.D. program at ISU and the Department Chair will be notified in writing of this decision. Students with less than a 3.25 coursework G.P.A. would not ordinarily be recommended for further study.

- B. Students who have completed both the B.S. and M.S. degrees in Agricultural Engineering at ISU, are encouraged to pursue the Ph.D. elsewhere.

XII. TIMING AND CHECKLIST OF REQUIRED ACTIONS

GRADUATE STUDENT PROGRAM CHECKLIST⁶

1.	English requirement (International students)	M.S., Ph.D.	1st semester in residence	_____
2.	POS Committee	M.S., Ph.D.	During 1st semester	_____
3.	Program of Study (POS) submitted to Graduate College	M.S., Ph.D.	By end of 2nd semester	_____
4.	Request of Preliminary Examination	Ph.D.	When majority of coursework is completed	_____

Note: *Arranged by the student and major professor (both written and oral).*

5.	Report of Preliminary Examination	Ph.D.	By major professor	_____
6.	Enrichment component for (see definition of enrichment component)	Ph.D.	At least 6 months before final exam	_____
7.	Diploma Slip	M.S., Ph.D.	By beginning of semester of graduation (check Graduate College deadlines)	_____
8.	Request for Final Examination	M.S., Ph.D.	At least two weeks before examination	_____
9.	Report of Final Examination	M.S., Ph.D.	By major professor	_____

Note: *Responsibility for convening the Committee rests with the student and the major professor. No notice is sent from the Graduate College Office.*

⁶Note that the Agricultural and Biosystems Engineering Department has replaced a language requirement by an enrichment component.

XIII. OTHER GRADUATE STUDENTS ADMINISTERED IN AGRICULTURAL AND BIOSYSTEMS ENGINEERING

The interdisciplinary nature of Agricultural Engineering research has created opportunities for graduate students in other curricula to work on Departmental projects. Students in the following programs have been employed in and supervised by Department faculty:

- Environmental Sciences
- Toxicology
- General Graduate Studies
- Food Science and Human Nutrition

Students are responsible for meeting the academic requirements of their respective curricula. However, students receiving support from Departmental funds must follow certain sections of the Guide:

- II. Types of appointment
- III. Sick leave and vacation
- IV. University-approved travel
- V. Use of departmental facilities
- VIII. Thesis research publication
- XI. Graduate student progress
- XII. Teaching-extension experience

XIV. ACCEPTABLE COURSES FOR MATHEMATICS REQUIREMENT

It is the responsibility of student's POS committee to ensure that the course content is appropriate to meet the graduate mathematics requirements, with final approval by the ABE Graduate Faculty Committee. The criteria below should be used as to determine whether a course is an appropriate graduate level mathematics course.

1. The course is specially relevant to a student's graduate education and the course content is at a higher level than that normally taken by engineering undergraduates, and
2. The course content should consist of at least 75% theoretical and/or applied mathematics; this may include non-mathematics courses in other departments which the application of advanced mathematical methods is a major component of the course.

[The following incomplete list of topics are provided as examples of material which is considered appropriate for the mathematical requirement:

- (i) Advanced calculus, matrix theory, and partial differential equations,
- (ii) Linear and non-linear programming, computational algorithms, and numerical methods,
- (iii) Image and digital signal processing, random signal processing, and kalman filtering,

- (iv) Optimization and control theory,
- (v) Computational fluid dynamics and heat transfer, and
- (vi) Advanced modeling methods and dynamic simulation.]

XV. CONCURRENT BS/MS PROGRAM

Introduction

The concurrent Bachelor of Science /Master of Science (BS/MS) agricultural engineering degree program in the Department of Agricultural and Biosystems Engineering is designed for those qualified students who have made a decision, before their last two semesters, to pursue a graduate degree with thesis. This program allows the student to take graduate courses in their field of study and to be eligible for a research assistantship during their senior year. With proper planning students may complete the M.S. degree within 18 months following their B.S. graduation.

Eligibility

To be eligible for application, a student must meet the following criteria.

1. Have a minimum GPA of 3.2/4.00.
2. Be within two semesters of graduation.
3. Be able to satisfy all graduation requirements for the B.S. with < 24 credit hours remaining on the program.

Application Process

Students interested in the concurrent program should identify their graduate specialization area of interest before the end of their junior year. We recommend that student contact the Chair of Graduate Programs Committee or a faculty member in the Department to discuss the concurrent program details and arrange for faculty interviews on various research topics being conducted by the faculty. The student will need to select a major professor from among those on graduate faculty and begin the admission process. A student should take at least two 500 level courses during the senior year that count toward the M.S. (but not the B.S.) degree.

Admission

Admission criteria are similar to those used for all graduate students in the Department. Qualifying students must complete the "Concurrent Enrollment Request Form" simultaneously with the standard graduate school application form. Both forms are available from 102 Davidson Hall. Applications for admission to the program will be reviewed by the department's graduate program committee. A Program of Study (POS) committee must be established no later than the second semester following admission.

Tuition Fees

A student accepted into the concurrent BS/MS program and qualified for a research assistantship (RA) appointment would pay in-state graduate tuition fees. RA appointments allow reduction in those fees as per Graduate College rules of the graduate tuition.

Graduate Coursework

In order to qualify for a Master of Science degree, the graduate work must be accomplished in accordance with the guidelines established in the current issue of the Agricultural and Biosystems Engineering Department “Graduate Student Guide”. The concurrent BS/MS program allows students to take graduate courses for graduate credits as a senior.

Specialty Areas

Within the major the student will have the opportunity to work in the following specialty areas: water and environment, power and machinery, food and processing, structures and environment, and biosystems.

Research Assistantship

Students will be eligible to receive a quarter or half-time research assistantship in their senior year. It is anticipated that they will complete the program in 18 months or less after accumulating the credits normally required for the B.S. degree. If supported by a half-time research assistantship, a student may take up to 12 credit hours of course work and research each semester and up to 7 credit hours in the summer session and must work towards a M.S. degree with Thesis.