

## **Integrated B.S./M.S. Degree Program in Biological Systems Engineering**

Graduate Program in Biological Systems Engineering

Approved by Graduate Council on June 2, 2006

The Graduate Program in Biological Systems Engineering offers an integrated degree program to provide an early exposure to graduate work and encourage the transition to graduate school by highly qualified undergraduate students in our BS program. The integrated degree program can be completed in slightly more than five years.

### **Motivation for the Integrated Degree Program**

The integrated degree program creates a mechanism by which highly qualified undergraduate students can strengthen their preparation either for the job market or for graduate school. The program presents the students with an opportunity for an early exposure to a graduate course, eases their transition to graduate school, and reduces overall time to a graduate degree. This program is also useful in encouraging highly qualified students to pursue a graduate education. The integrated degree program is similar to the existing Ms Plan I and MEng degrees. Students pursuing either the Plan I or Plan II integrated degree programs will realize certain benefits in meeting the requirements in a timely manner. Students pursuing the integrated MS Plan I degree are required to complete a total of 30 units, as opposed to 36 units in the standard MS Plan I program. This efficiency is justified because students in the integrated degree will take a graduate level course during their senior year that counts toward their BS degree and provides for graduate level preparation in advance of the MS degree. Students pursuing the integrated MS Plan II degree will not be required to complete an engineering project with its associated report as is required in the standard Plan II MEng degree.

### **Integrated Degree Program Requirements**

#### **1. Admission Requirements**

##### **a) Application Procedure:**

Highly qualified undergraduate BSE students will be encouraged to apply to the integrated program. The application will be due by the end of Winter Quarter in the students' junior year. The application procedure will be as follows:

- By the end of Fall quarter, students in their junior year with a GPA above 3.5 will be identified by the department and encouraged to apply to the integrated degree program.
- The Graduate adviser will meet with the interested student and identify a major professor, whose expertise is in the same area as that of the student's interest.
- By the end of Winter quarter, students should apply to the program by completing the standard MS application form (<http://gradstudies.ucdavis.edu/homepage.htm>) and paying appropriate fees.

- Students with a GPA under 3.5 who are applying to the program must take the GRE test by the end of Winter quarter.
- All students applying to the program will be required to submit three letters of recommendation.
- Upon admission to the program (Spring quarter of the Junior year) the student will work with the major professor to select an appropriate graduate course to be taken during the senior year.
- Students admitted to the IDP will be invited to the new student orientation in the Fall quarter, when the graduate adviser will explain all the degree requirements. The student will work with his/her major professor and constitute a course guidance committee early in his/her senior year to plan their program of study. S/he must submit the program of study to the Executive committee for approval by the end of the Spring quarter of the senior year.

#### b) Eligibility

The program is available only to UCD students in the Biological Systems Engineering major with strong academic records. Students with a GPA above 3.5 will not be required to take the GRE test at the time of their application. However, these students will be encouraged to take the test by the end of Fall quarter of their senior year as it is required for many fellowship applications. Although there is no firm GPA cutoff, students with a GPA under 3.25 are not likely to be admitted to the integrated degree program.

#### c) Change to Graduate Status:

The students in this program are awarded a Bachelor's degree as soon as they complete all the requirements for the BS degree. They will be advanced to graduate status in the quarter immediately following completion of their BS degree.

**2. Master's Plan:** There will be two MS degree options - MS Plan I (Thesis option) and MS Plan II (Comprehensive Examination option). Both plans satisfy the graduate degree requirements as stipulated by the Academic Senate.

([http://www.mrak.ucdavis.edu/senate/documents\\_regulations.htm](http://www.mrak.ucdavis.edu/senate/documents_regulations.htm)).

### 3. Course Requirements:

a) Core requirements: EBS 200 Research Methods in Biological Systems Engineering (2 Units)

b) Electives:

#### Requirements within the BS degree

- Students admitted to the program will take an appropriate 3-unit graduate course selected in consultation with their major professor during their senior year, in lieu of the 3-unit upper division engineering elective required for the BS degree in BSE.

## Requirements for the MS degree

**MS Plan I (Thesis option):** The degree requirements under this plan are depicted in Figure 1 and summarized below:

- Total units required: 30
- At least 17 units of upper-division and graduate technical coursework must be in courses other than research and seminar.
- At least 13 of the 17 units must be earned in graduate engineering (200 series) exclusive of research and seminar courses (290, 290C, and 299). Students must include the core course - EBS 200 “Research Methods in Biological Systems Engineering” (2 units) in this 13 unit requirement.
- The remainder of the 17 units may be made up of upper division courses (100 series), or of other graduate courses exclusive of research and seminar courses.
- The Master's thesis is based on at least six units of research carried out for credit under the 290C and 299 course numbers.

This plan gives a 6 unit reduction in total units and in upper division and graduate technical courses relative to the current MS Plan I program in Biological Systems Engineering. However, students in the integrated BS/MS program are required to take a 3-unit graduate course in their senior year.

**MS Plan II (Comprehensive Examination option):** The degree requirements under this plan are depicted in Figure 2 and summarized below:

- Total units required: 36
- At least 27 units of upper-division and graduate technical coursework must be in courses other than research and seminar.
- At least 11 of the 27 units must be earned in graduate engineering (200 series) exclusive of research and seminar courses (290, 290C, and 299). Students must include the core course, EBS 200 “Research Methods in Biological Systems Engineering” (2 units) in this 11 unit requirement.
- The remainder of the 27 units may be made up of upper division courses (100 series), or of other graduate courses exclusive of research and seminar courses.
- A maximum of 9 units of research carried out for credit under the 290C and 299 course numbers may be used to satisfy the 36 unit requirement.

An oral comprehensive examination before a committee of three faculty members is required for students in the MS Plan II program. The examination will be administered after all course requirements have been satisfied.

## 4. Committees:

a) Admission Committee: The graduate admission adviser and staff adviser handle all application-related issues. The admission adviser will circulate the application packet to three

faculty members of the Biological Systems Engineering graduate program whose research interests match those of the applicant. Based on the evaluations of the three faculty members, the graduate admission adviser will make the admission decision.

b) **Course Guidance or Advising Committee:** Upon acceptance into the program, students are required to meet with an assigned major professor in their primary technical area of interest to plan their proposed plan of study. Prior to the beginning of Fall quarter of their senior year, students must submit a Program of Study for the completion of their BS and for their MS degrees. Students will meet with their major professor at least once per quarter during their senior year.

c) **Thesis Committee or Comprehensive Examination Committee:** Students who are pursuing the MS Plan I (Thesis option) should consult their major professor and suggest the names of three faculty members to serve on their thesis committee to the Graduate Adviser, who then recommends the thesis committee membership to the Dean of Graduate Studies for approval.

Students who are pursuing MS Plan II (Comprehensive Examination option) should consult their major professor and suggest the names of the Comprehensive Examination Committee members to the Graduate Adviser for approval.

**5. Advising Structure and Mentoring:** The graduate adviser will go over the degree requirements with all admitted graduate students including students in the integrated degree program. The Graduate Adviser and the staff adviser are available to discuss all matters pertinent to the graduate program. Students admitted to the Biological Systems Engineering Graduate Program work closely with their respective major professors.

**6. Advancement to Candidacy:** Students admitted to the MS degree program (both Plans I and II) must file the advancement to candidacy form when they finish all the coursework on their program of study.

**7. Typical timeline and sequence of events:** The following degree checklist provides various milestones:

- ✓ Select a guidance committee and put together a program of study during the Fall quarter of the senior year. **This program of study should be submitted to the Executive Committee for approval by the end of the senior year.**
- ✓ Upon completion of all courses on your program of study, complete the advancement to candidacy form and submit it to graduate studies. Students who are pursuing MS Plan I (Thesis option) propose their thesis committee members at this time. Students who are pursuing MS Plan II (Comprehensive Examination option) must propose the comprehensive examination committee members at this time.

➤ **MS Plan I (Thesis Option) candidates only:**

- Upon completion of your research submit your thesis rough draft to the thesis committee and **schedule your public presentation with the approval of the committee members.**
- Following the public presentation **obtain signatures from the thesis committee members and submit the signed form to the Graduate Adviser.**
- Submit the final version of the thesis to Graduate Studies!

➤ **MS Plan II (Comprehensive Examination Option):**

- Schedule the comprehensive examination in consultation with the committee members.
- Pass the comprehensive examination!

**9. Sources of Funding:** The majority of our graduate students are supported as Graduate Student Researchers (GSR) on research projects directed by individual faculty members in the program. Students who are pursuing the MS Plan I should explore this possibility. Those in MS Plan I or Plan II are eligible for a limited number of Teaching Assistantship (TA) positions within the department and may apply for TA positions elsewhere on campus. Furthermore, limited scholarships and fellowships are available to highly qualified students.

**10. PELP and Filing Fee Status:** The planned educational leave program (PELP) is available to students to suspend their program of studies for good cause (i.e. illness, temporary departure from the University for employment or research away from campus, financial problems, personal problems) and leave the campus, and be guaranteed the right to return later to resume academic work. The minimum duration of PELP is one quarter and maximum duration is three quarters.

Filing Fee is a non-registered status available to students who have completed all their coursework and research, and have been advanced to candidacy. Students on filing fee status no longer have any need to use campus facilities. The College of Engineering requires that the student complete the rough draft of the thesis and submit it to the thesis committee before going onto filing fee status. Students must complete not only the appropriate Office of Graduate Studies form but also a special filing fee status form for the College of Engineering. Filing fee status maintains a student's eligibility to complete degree requirements while not being registered, within approved time limitations (currently two quarters).

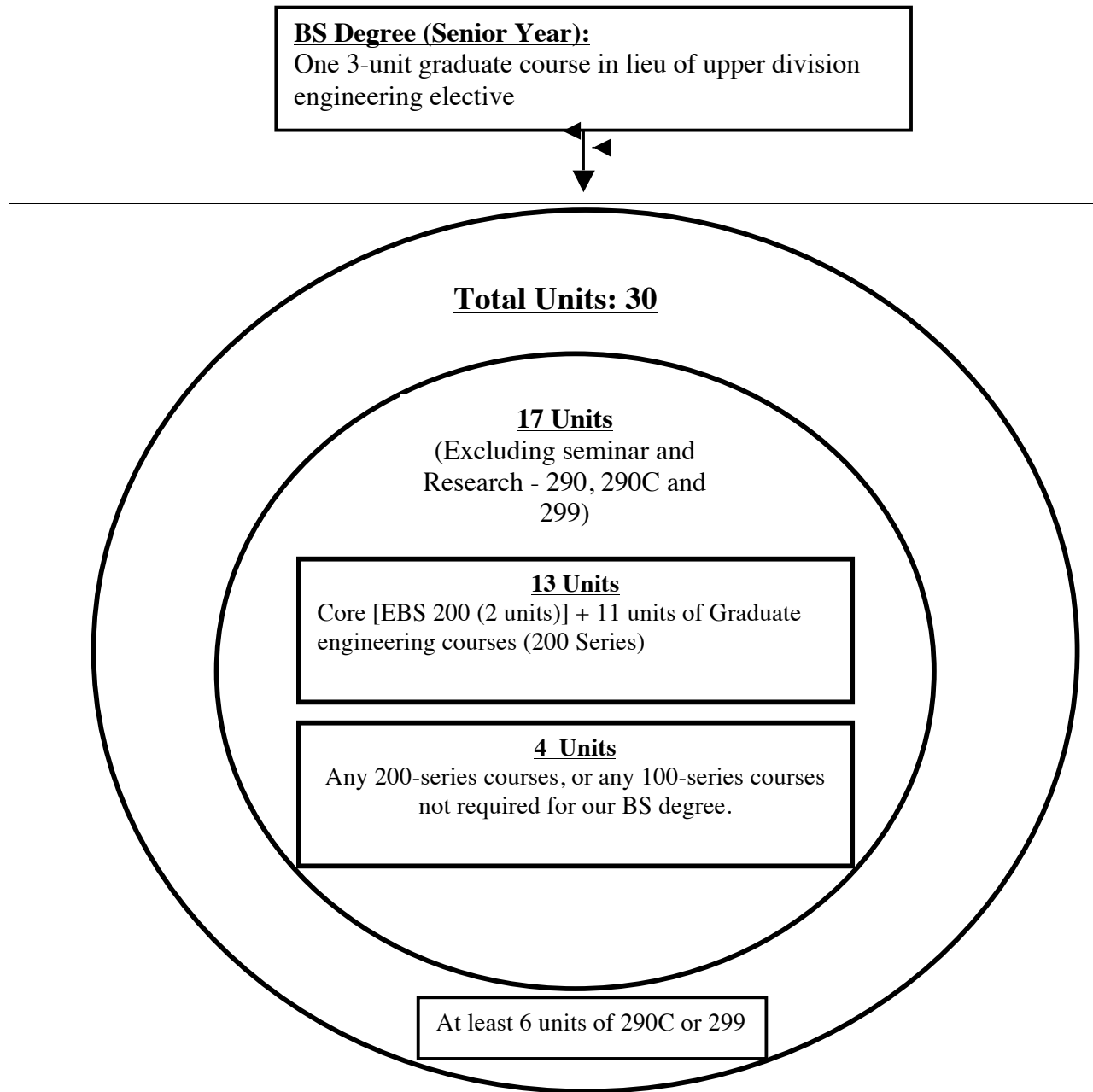
**11. Thesis requirements (MS Plan I):** Students pursuing this option are required to make a public presentation of their thesis research. Upon submission of the draft of the thesis to the thesis committee, the student must select a date for the public presentation that is suitable to the thesis committee members and the department seminar coordinator.

**12. Comprehensive Examination Requirements (MS Plan II):** At the time of advancement to candidacy, students pursuing this option must set up a comprehensive examination committee of three faculty members in consultation with their major professor and submit it to the graduate adviser for approval. The chair of the examination committee and at least one other member must be in the Biological Systems Engineering Graduate Program. The format of the examination will be oral.

## **Graduation**

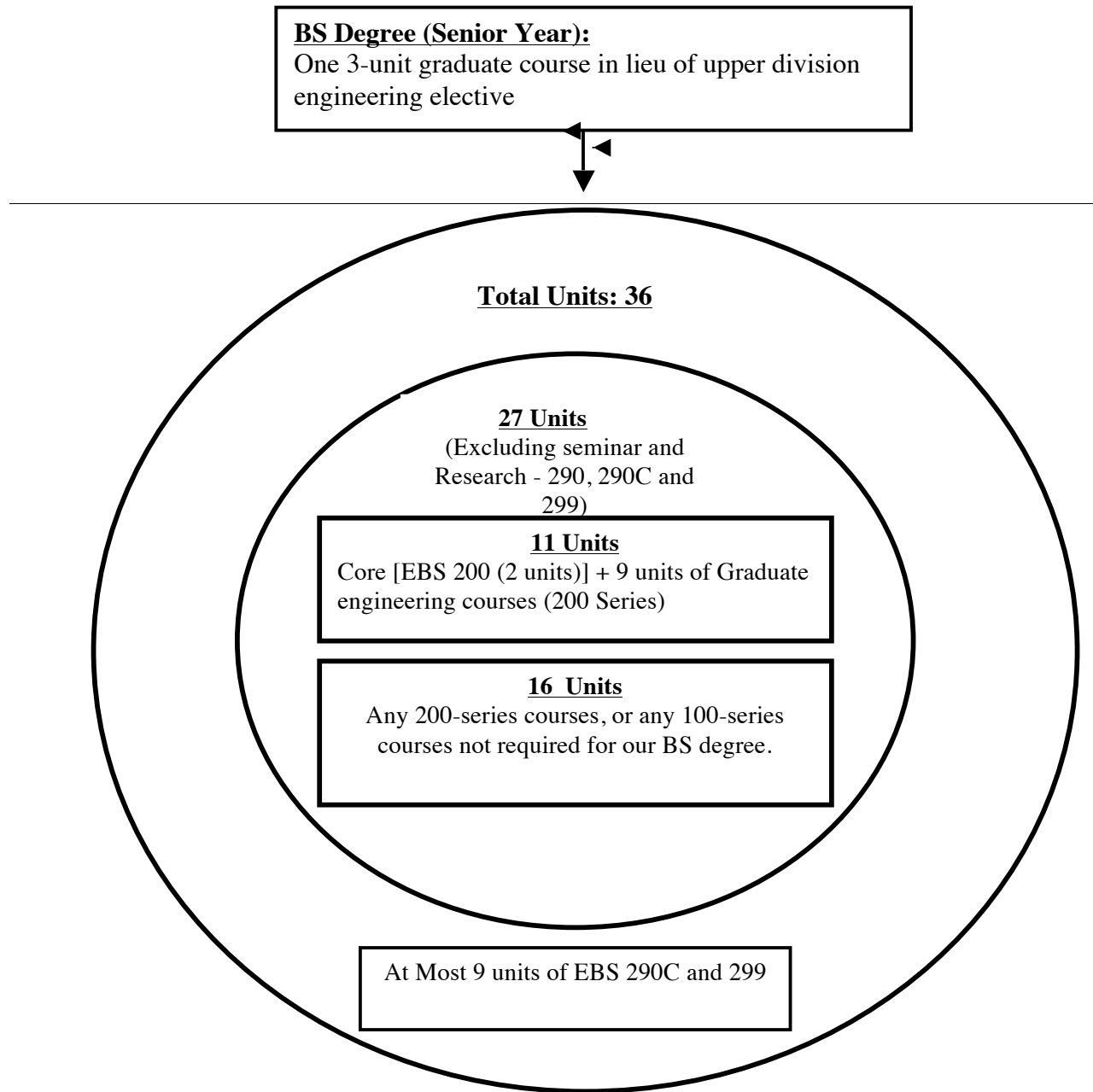
Students who successfully complete the program will receive the MS and BS degrees. It is intended that most students will complete both degrees in a total of five years. Students will file for their BS degree when their BS degree requirements have been satisfied. They will be advanced to graduate standing at that time.

**M.S. Plan I (Thesis Option)**



**Figure 1. Course requirements for MS Plan I (Thesis option)**

**M.S. Plan II (Comprehensive Examination)**



**Figure 2. Course requirements for MS Plan II (Comprehensive Examination option)**