Expected Outcome 1: Communication
Biosystems Engineering graduates are trained to be effective oral and written communicators.

Assessment Method 1: BSEN 3310 Lab Reports Grade

Assessment Method Description
Students write comprehensive reports from the laboratory part of BSEN 3310. These reports are written according to the manuscript preparation format and guidelines used by our professional organization (American Society of Agricultural and Biological Engineers - ASABE). Student are evaluated based on (a) ability to correctly use and cite references, (b) quality and relevance of figures and tables, (c) organization of report, and (d) writing grammar/style. Our criteria for success is that the average score on the quality of writing in the course be 80% or higher.

Findings
The average score for the technical writing aspect of the lab reports submitted by the 31 students that enrolled in Fall 2013 BSEN 3310 was 83%. This score is slightly higher than the criteria of average score of 80%. One weakness that we identified was that students do not use references to support discussion in the report. WE also found that students do not critically evaluate and discuss data obtained from laboratory results.

How did you use findings for improvement?
The course instructor will continue to reinforce the importance of writing to the students and will extend the lecture hours used to introduce scientific writing to students.

Assessment Method 2: BSEN 4300 Oral Presentation

Assessment Method Description
BSEN 4300 is a professional practice course that is designed to
prepare students for transition to careers as practicing engineers. An important component of this course is to assist students in refining their oral communication skills. Towards the end of the semester, each student gives a formal autobiography presentation. Students are evaluated based on use of visual aids, oral clarity, and presentation organization. Our criteria for success using this assessment method is that the average score of the students should be 80% or higher.

Findings
The average score of the 27 students in the 2013 Fall BSEN 4300 was 91%. In general, the students were professional in their presentation and their slides were well organized. One weakness that was common to all students was the inappropriate use of color contrast and font size.

How did you use findings for improvement?
Even though the average score of 91% greatly exceeds our goal of 80% or higher, we will continue to work with students to refine their oral communication skills.

Additional Comments
Assessment Method 3: BSEN 4310 Communication

Assessment Method Description
BSEN 4310 is the capstone design course for Biosystems Engineering undergraduate program. In the course, the students are required to develop solutions to real world engineering problems that are usually obtained from industrial partners and other clientele. During the course of the semester, students give at least four powerpoint presentations and two poster presentations, and submit several reports (including final project report) to clients, faculty advisors, and course instructors. The students are evaluated based on project reports and oral presentations general formatting and neatness, organization, visuals appropriateness and quality, and suitability of delivery of engineering design. Our goal is that the average score for communication skills of BSEN students be 80% or greater.

Findings
The average grade for the 2014 BSEN 4310 students was 85%. Project reports were generally well formatted and organized by the students. We however found that students need more guidance in (a) the use of references that support their selection of design solution to assigned problem, and (b) in the use of graphics to convey engineering design in their reports and during oral presentations.
How did you use the findings for improvement?
Even though the average score of 85% is higher than our goal of 80%, our assessment is that the students need assistance with the use of graphics and visual aids to convey engineering design. The instructors will devote more class hours to assist with this deficiency.

Additional Comments

Assessment Method 4
Graduating Senior Exit Survey

Assessment Method(s) Description
The Biosystems Engineering department head conduct exit interviews of graduating seniors that includes a questionnaire that is completed by the students. One of the questions in the questionnaire is 'Do you feel that you can communicate effectively?' The scale is from 1 to 5 (1 - Disagree, 5 - Agree). Our goal is that the average rating from the students be 4.0 or higher.

Findings
The average score from the 21 Biosystems Engineering graduating seniors that completed the questionnaire was 4.80. One common comment from the students is that the 6 oral presentations they had to deliver in BSEN 4310 (senior design) and the several written reports they had to prepare in the junior and senior level courses have improved their communication skills. We will maintain this number of oral presentations during the senior design sequence courses and continue to provide more opportunities for the students to improve their written communication skills (e.g. our plan is to embed eportfolio in the sophomore, junior and senior level courses starting in the 2014-2015 academic year).

How did you use findings for improvement?
Even though the students scored themselves higher than the BSEN goal in their communication ability, Biosystems Engineering faculty will continue to assist students to improve their communication skills. For example, eportfolio will be embedded in the sophomore, junior and senior level courses starting in the 2014-2015 academic year.

Additional Comments
Expected Outcome 2: Engineering Design

Biosystems Engineering graduates are trained to identify, formulate and solve engineering problems that are associated with the environment and natural resources, and the production, processing, storage, manufacture, utilization and recycling of biological products.

Assessment Method 1: BSEn 4310 Design Grade

Assessment Method Description
BSEn 4310 is the capstone design course for Biosystems Engineering undergraduate program. The students develop solutions to real world engineering problems that are usually obtained from industrial partners and other clientele. Students are evaluated based on the engineering and economic analyses that were used in developing solutions to assigned problems while addressing safety, environmental and societal constraints. The grades are based on inputs from clients, faculty and class instructors. Our criteria for success using this assessment method is that the average score of students be 80% or higher.

Findings
The average grade for the 27 students in the 2014 BSEN 4310 class in relation to engineering design was 85% which is higher than the 80% goal for BSEN students. Comments from the course evaluation and from questions asked by clients during presentations is that the students in general do not adequately incorporate safety considerations and standards in their final design. Students also need more guidance with preparing assembly drawings that includes design parts and components.

How did you use findings for improvement?
Course instructors will increase emphasis on computer-aided drawing, use of engineering standards in design and safety engineering.

Additional Comments
Assessment Method 2: Exit Survey

Assessment Method Description
The Biosystems Engineering department head conduct exit interviews of graduating seniors that includes a questionnaire that is completed by the students. One of the questions in the questionnaire is 'How well do you feel that you are prepared to identify, formulate and solve engineering problems?'. Using a scale of 1 to 5 (1 - Disagree, 5 - Agree), our goal is that the average rating from the students be 4.0 or greater.
Findings
The average score from the 21 BSEN graduating senior students that completed the questionnaire was 4.4. This is above our minimum goal of 4. Several of the students commented that they appreciate the real world design experience they were exposed to in BSEN 4310 capstone course.

How did you use findings for improvement?
We are introducing ePortfolio into the BSEN curriculum at the sophomore, junior and senior level courses that will enable students to reflect and articulate their technical skills hence make connection between course offerings. We are also developing a multimedia case study that will expose students to real-life engineering problems and the role of the BSEN course offerings in developing feasible solutions to real-life engineering problems.

Additional Comments

Expected Outcome 2: Global and societal context
Graduates of Biosystems Engineering understand the impact of engineering in global and societal context.

Assessment Method 1: BSEN 4310
Assessment Method Description
BSEN 4310 is the capstone design course for Biosystems Engineering undergraduate program. Students develop solutions to real-world engineering problems that are usually obtained from industrial partners and other clientele. Students are required to understand the global impact and societal implication of their engineering design solutions. During oral and poster presentations, and in written reports, students are required to present how they have addressed global and societal issues related to proposed design. The grading (from project sponsors, faculty, and course advisors) for this aspect of the course is on a 0-100% scale. Our criterion for success using this assessment method is that the average score be 80% or higher.
Findings
The average global/societal context grade for the 27 students in the 2014 BSEN 4310 was 88%. In general, students understood and clearly articulated the global and societal benefits of engineering design solutions. Course instructors however feel that the understanding of societal implication of engineering design mistake/failure is not fully appreciated by students.

How did you use findings for improvement?
BSEM 4310 course instructors will continue to reinforce the importance of global and societal implications of engineering solutions to students. To improve the global awareness and diverse viewpoint of BSEN students, the Auburn University 'Common Book;' will be part of the reading requirement for BSEN students in the Professional Practice Course (BSEN 4300 - the first course in the capstone design sequence) as from 2014-2015 academic session.

Additional Comments

Expected Outcome 2: Professionalism and Ethics
Graduates of Biosystems Engineering have been prepared to practice engineering profession in professional and ethical manner.

Assessment Method 1: BSEN 4310 Professionalism
Assessment Method Description
BSEN 4310 is the capstone design course for Biosystems Engineering undergraduate program. The students develop solutions to real-world engineering problems that are usually obtained from industry partners and other clientele. As part of the requirement for the course, students are graded on professionalism that include timeliness, team work, attitude, integrity, ethics etc. Our criteria for success is that the average grade for this assessment be 80% or greater.

Findings
The average score for professionalism for the 27 students in the 2014 BSEN 4310 course was 91%. In general, the students acted in a professional manner during the semester. Most of the students attended class, were punctual, were respectful to design partners and project sponsors, and demonstrated professional integrity throughout the design process.
How did you use findings for improvement?

We are satisfied by the professionalism and ethics demonstrated by BSEN students. We will however continue to expose the student to professionalism and ethical issues in engineering include inviting professionals and alums to address professionalism and ethical issues they have encountered as practicing engineers.

Additional Comments
Assessment Method 2: Exit Survey

Assessment Method Description
The Biosystems Engineering department head conducts exit interviews with graduating seniors that includes a questionnaire that is completed by each student. One of the questions in the questionnaire is 'How well do you understand professional and ethical responsibility as an engineer?' With a scale of 1 to 5 (1 - Disagree, 5 - Agree), our criterion for success for this assessment is a minimum score of 4 out of 5.

Findings
The average score from the 21 students that completed the 2013-2014 academic year exit survey regarding their understanding of professionalism and ethics was 4.8. This is higher than the departmental goal of minimum of 4.0. In general, the students commented that the guest speakers enabled them to understand and appreciate the importance of ethics and professionalism in engineering. The students were satisfied with the coverage of professionalism and ethics in the BSEN capstone course sequence.

How did you use findings for improvement?
We are satisfied that our students understand the importance of professionalism and ethics in the biosystems engineering professional. BSEN 4300 and 4310 course instructors will continue to expose the students to professionalism and ethics issues while the students develop solutions to assigned engineering problems.

Additional Comments