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 format and guidelines used by our professional organization (American Society of Agricultural and Biological Engineers - ASABE) for manuscript submissions. 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 28 students that enrolled in Fall 2012 BSEN 3310 was 81.0%. This score is slightly higher than the criteria of average score of 80%. One weakness that was identified was that students use references that do not appropriately support the 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 from one lecture hour to two lecture hours.

Additional Comments
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 professional 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 obtained by the 18 students in the 2012 Fall BSEN 4300 was 92%. In general, the students were professional in their presentation and their slides were well organized. One weakness that is common to all of the students was the use of color contrast and font size.

How did you use findings for improvement?
Even though this greatly exceeds our goal of 80% of 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. The students develop solutions to a real-world engineering problems that are obtained from industry partners and other client groups. 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 for BSEN students be 80% or greater.

Findings
The average grade for the 2013 BSEN 4310 students was 82%. Project reports are generally well formatted and organized by BSEN students. We also found that students need more guidance in (a) the use of references that appropriately support discussion and conclusions in the report, 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 82% is higher than our goal of 80%, we notice that the students struggle with detailed technical writing. The instructors will devote more class hours to referencing and to use of graphics and visual aids to convey engineering design.

**Additional Comments**

**Assessment Method 4**

**Exit Survey**

**Assessment Method(s) Description**

The Biosystems Engineering department head conducts exit interviews of all graduating seniors that includes a questionnaire that is completed by each student. One of the questions in the questionnaire is 'Do you feel that you can communicate effectively?' The scale was from 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 14 Biosystems Engineering students that graduated in 2012-2013 academic year regarding their ability to communicate is 4.85. One common comment from the students is that the frequency of oral presentations in the senior design sequence courses has made them to be more comfortable with oral presentation. We will maintain this frequency (typically 6 oral presentations) during the senior design sequence courses while providing more guidance for the students in the area of written communication.

**How did you use findings for improvement?**

Even though the students gave a high score to themselves in their communication ability, faculty in Biosystems believe that the communication skills (especially written communication skills) needs improvement. The instructors for BSEN 4310 and BSEN 3310 have agreed to work more with students on the writing ability skills. We are also discussing incorporating other writing initiatives such as ePortfolio in the BSEN curriculum.

**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: Final Grade from BSEN 4310
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 obtained from industry partners and other client groups. Students are evaluated on the engineering and economic analyses that were used in developing solutions to assigned problems while addressing safety and environmental constraints. The final grade (based on inputs from clients, faculty and class instructors) in BSEN 4310 is used to assess this outcome. Our goal is that the average final grade for Biosystems Engineering students be at least 80%.

Findings
The average grade for the 2013 BSEN 4310 class was 79.1%. This is above the 80% criterion. BSEN students adequately addressed environmental constraints but struggle with incorporating safety considerations in their final design. Students also need more guidance with preparing assembly drawings that includes how parts and components are interconnected.

How did you use findings for improvement?
We will extend the class sessions on computer-aided drawing and safety engineering.

Additional Comments

Assessment Method 2: Exit Survey
Assessment Method Description
The Biosystems Engineering department head conducts exit interviews of all graduating seniors that includes a questionnaire that is completed by each student. One of the questions in the questionnaire is 'How well do you feel you are prepared to identify, formulate and solve engineering problems'. The scale was from 1 to 5 (1 - Disagree, 5 - Agree). Our goal is that the average rating by the students be 4.0 or greater.
Findings
On the 1 to 5 scale, the average score returned by the 14 BSEN students was 4.18. This is above our minimum goal of 4 out of 5. Several of the students commented that the senior design capstone sequence effectively prepares them for an engineering job. It seems from students comments that they cannot make connections between the course offerings in the curriculum.

How did you use findings for improvement?
The exit survey results have been communicated to faculty and other stakeholders. We are introducing ePortfolio into our curriculum that will enable students to reflect and articulate their technical skills hence making connection between course offerings. Also, we are developing a multimedia case study that will expose students to real-life engineering problems and how the courses play major role in developing feasible engineering solutions to real-life problems.

Additional Comments

Expected Outcome 3: 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. The students develop solutions to real-world engineering problems that are obtained from industrial partners. Students are expected (and therefore graded) to understand the global impact and societal implication of their engineering design solutions. During oral and poster presentations, and in written reports, students are expected to clearly present how they have addressed global and societal issues related to proposed design. The grading (by project sponsors, faculty, graduate students and course advisors) for this aspect of the course is on a 0-100% scale. Our criteria for success using this assessment method is that the average score of students be 80% or higher.
Findings
The average global/societal context grade for the 17 students in 2013 BSEN 4310 class is 85.1%. In general, students clearly articulated the global and societal benefits of engineering design solutions. Only one student scored (77%) below the 80% target. Nevertheless, the course instructors noted that the students do not fully appreciate the societal implication an engineering design mistake/failure.

How did you use findings for improvement?
The course instructors for BSEN 4310 will continue to reinforce the importance of global and societal implications of engineering solutions developed by students.

Additional Comments

Assessment Method 2: Exit Survey

Assessment Method Description
The Biosystems Engineering department head conducts exit interviews of all graduating seniors that includes a questionnaire that is completed by each student. One of the questions in the questionnaire is 'Do you feel that you gained an education broad enough to understand the impact of engineering solutions in a global and societal context?'. The scale was from 1 to 5 (1 - Disagree, 5 - Agree). Our goal is that the average rating from students be 4.0 or greater in their understanding of global and societal implications of engineering solutions.

Findings
The average global/societal score from the 14 graduating BSEN students that participated in the survey was 4.08. This is slightly above the minimum score of 4.0. The students did not provide feedback about their understanding of the impact of engineering in global and societal context.

How did you use findings for improvement?
The results from this assessment method has been communicated to faculty and other stakeholders. Possible solutions to improving the understanding of the global and societal implications of engineering design are being developed by faculty.

Additional Comments
**Expected Outcome 4: 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 obtained from industry partners and other client groups. 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 of students for this assessment be 80% or greater in BSEN 4310.

**Findings**
The average score for professionalism for the 17 students in the 2013 BSEN 4310 course was 88.5%. In general, the students acted in a professional manner during the semester. Most of the students attended class and were punctual, were respectful to design partners and project sponsors and demonstrated integrity throughout the design process.

**How did you use findings for improvement?**
We are satisfied with the professionalism and ethics demonstrated by biosystems engineering students. We will however continue to expose the students to professionalism and ethical issues in engineering including guest lectures from industrial partners.

**Additional Comments**

**Assessment Method 2:** Exit Survey

**Assessment Method Description**
The Biosystems Engineering department head conducts exit interviews for 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?' The scale was from 1 to 5 (1- Disagree, 5 - Agree). Our criteria for success for this assessment is a minimum score of 4 out of 5.
Findings
The average score from 14 students that completed the 2012-2013 academic year exit survey regarding their understanding of professionalism and ethics in engineering was 4.38. This is higher than the department goal of minimum of 4.0. The students commented that in general the guest speakers that were invited to the senior design sequence courses enabled them to understand and appreciate the importance of professionalism in engineering. The students did not have negative comments about their preparation for professionalism in BSEN.

How did you use findings for improvement?
We are satisfied that our students understand the importance of professionalism and ethics in the biosystems engineering profession. The course instructors (BSEN 4310) will continue to work with students to improve their understanding of professionalism and ethics.

Additional Comments
Assessment Method 3:
Assessment Method Description
The Biosystems Engineering department head conducts exit interviews for 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?' The scale was from 1 to 5 (1 - Disagree, 5 - Agree). Our criteria for success for this assessment is a minimum score of 4 out of 5.

Findings

How did you use the findings for improvement?

Additional Comments