Expected Outcome 1: Advanced Knowledge of Biosystems Engineering

Biosystems Engineering Ph.D. graduates will exhibit an advanced and detailed knowledge of the basic sciences that are associated with one or more areas of specialization in Biosystems Engineering.

Assessment Method 1: Graded Course Work

Assessment Method Description
Biosystems Engineering Ph.D. students are required to earn a minimum of 30 graded credit semester hours of graduate course work. Our goal is that BSEN Ph.D. students earn average grade of 3.5 out of 4.0 scale in the graded course work.

Findings
Biosystems Engineering M.S. and Ph.D. programs started in the Fall of 2010. Three students have completed the Ph.D. Biosystems Engineering graduate program since inception. The average scores obtained by these students in the graded course work was 3.61 on a 4.0 scale.

How did you use findings for improvement?
Due to few number of students that have completed the BSEN Ph.D. program, we do not have sufficient data to draw any conclusions/findings. We however now realize that use of final grade in course work is not appropriate for assessment. We are in the process of developing a different method to assess this outcome.

Additional Comments
Assessment Method 2: Doctoral Qualifying Examination

Assessment Method Description
Before the beginning of the third year of a Ph.D. student, a qualifying examination is conducted by the student advisory committee that
examines the students basic understanding and advanced knowledge of Biosystems Engineering. Our goal is that 80% of Ph.D. students pass this examination.

**Findings**
Biosystems Engineering M.S. and Ph.D. programs started in the Fall of 2010. Three students have completed the Ph.D. Biosystems Engineering graduate program since inception. All the three students passed the qualifying examination.

**How did you use findings for improvement?**
Even though our goal was met, due to few number of students that have completed the graduate programs, we do not have sufficient data to draw any conclusions/findings.

**Additional Comments**

**Expected Outcome 2: Communication**
Biosystems Engineering Ph.D. graduates will be proficient in oral and written communication skills.

**Assessment Method 1: Candidate's Advisory Committee**

**Assessment Method Description**
An evaluation form is completed by the student's advisory committee members and BSEN faculty members that are present at the time of the student's defense of research work. The evaluation form contains several questions include those specific to this outcome - (a) Demonstrated ability to effectively communicate through speaking, (b) Demonstrated ability to use effective and appropriate visual aids in presentations, and (c) Demonstrated ability to write effectively as evidenced by dissertation. Our criteria for success is that the average grade for the students is 4.5 out of a maximum of 6.0.

**Findings**
Biosystems Engineering M.S. and Ph.D. programs started in the Fall of 2010. Three students have completed the Ph.D. Biosystems Engineering program since inception. The average scores from the advisory committee and faculty assessment of Biosystems Engineering Ph.D. students were 5.25, 5.25 and 4.88 for speaking communication, visual aids and effective writing respectively.
How did you use findings for improvement?
Even though we reached our target of more than 4.5 out of 6.0 for the three metrics, the number of graduated Ph.D. students are too small to reach any meaningful conclusion. However, Biosystems Engineering faculty are in the process of identifying programs on campus to further enhance the visual presentation skills and speaking effectiveness of BSEN Ph.D. students.

Additional Comments
Assessment Method 2: Scholary Publications

Assessment Method Description
The quality of a Ph.D. dissertation is often judged by the amount of peer-review publications and technical presentations that are obtained from the dissertation. Our minimum requirement is that the number of scholarly publications in scientific literature and presentations at professional meetings be at least two.

Findings
Biosystems Engineering M.S. and Ph.D. programs started in the Fall of 2010. Three students have completed the Ph.D. Biosystems Engineering program since inception. Despite the low number of students, the average number of peer-reviewed publications are 4.7.

How did you use findings for improvement?
The average number of peer-reviewed publications exceed the minimum target set by the department. Even though this achievement by the Ph.D students is commendable, we are in the process of reviewing this assessment method.

Additional Comments
Assessment Method 3: Exit Survey

Assessment Method Description
The Biosystems Engineering department head conducts exit interviews of all graduating Ph.D. students that includes a questionnaire that is completed by each student. On a scale of 1 (disagree) to 5 (agree), the students were asked to rate their abilities in these two areas of communication: (a) Do you feel that you can communicate effectively using oral communication?, (b) Do you feel that you can communicate effectively using written communication?. Our criteria for success is that the average grade for the students is 4 out of 5.
Findings
Biosystems Engineering M.S. and Ph.D. programs started in the Fall of 2010. Three students have completed the Ph.D. Biosystems Engineering graduate program since inception but only two completed the exit survey. The average scores obtained from these two students in the two areas of communication (oral and written) were 5.0 and 5.0.

How did you use the findings for improvement?
The number of students that completed the exit survey is too small to draw any meaningful conclusions. Secondly, the exit survey scores by the students did not reflect the assessment results from faculty and student advisory committee. The Biosystems Engineering faculty will begin the evaluation of student's seminar (at least two by PhD students before dissertation defense) to identify lower speaking skills students early in the program.

Additional Comments

Expected Outcome 3: Lead and conduct cutting-edge research
Our Ph.D. graduates will demonstrate the ability to lead and conduct cutting-edge engineering research projects that lead to new discoveries and to development of sustainable design solutions

Assessment Method 1: Candidate's Advisory Committee

Assessment Method Description
An evaluation form is completed by the student's advisory committee members and BSEN faculty members that are present at the time of the student's defense of research work. The evaluation form contains several questions include those specific to this outcome - (a) Demonstrated leadership in conducting cutting-edge scientific research, and (b) Research resulted in scientific discovery. Our criteria for success is that the average grade for the students is 4.5 out of a maximum of 6.0.

Findings
Biosystems Engineering M.S. and Ph.D. programs started in the Fall of 2010. Three students have completed the BSEN Ph.D. program since inception. The average scores from the advisory committee and faculty assessment of the Ph.D. students were 4.63 and 4.31 for cutting-edge research and for scientific discovery respectively.
How did you use findings for improvement?
Since only three students have graduated from the Ph.D. program, the number of students is too small to draw any meaningful conclusions. However, the average of both scores (4.47) showed that we were close to our target (4.5).

Additional Comments
Assessment Method 2: Exit Survey

Assessment Method Description
The Biosystems Engineering department head conducts exit interviews of all graduating Ph.D students that includes a questionnaire that is completed by each student. One of the questions in the questionnaire is related to this outcome. The scale was from 1 to 5 (1 - Disagree, 5 - Agree). Our goal is that the ratings from students be at least 4.0.

Findings
Biosystems Engineering M.S. and Ph.D. programs started in the Fall of 2010. Three students have completed the BSEN Ph.D. program since inception but only two completed the exit survey. The average score by the students for this assessment was 5.0.

How did you use findings for improvement?
The number of students (2) that completed the exit survey is too small to draw any meaningful conclusions. The Biosystems Engineering faculty will begin the evaluation of students seminar (at least two by PhD students before dissertation defense).

Additional Comments