**Colorado State University – Pueblo Academic Program Assessment Report for AY 2012-2013** **Due: June 1, 2013**

**Program:**BS in Industrial Engineering **Date:** ___6 June 2013___

**Completed by:** Jane M Fraser

**Assessment contributors (other faculty involved in this program's assessment):** Bedoya, DePalma, Jaksic, Paudel, Sarper, Yuan

Please complete this form for each undergraduate, minor, certificate, and graduate program (e.g., B.A., B.S., M.S.) in your department. Please copy any addenda (e.g., rubrics) and paste them in this document, and return it to Erin Frew, erin.frew@colostate-pueblo.edu as an email attachment before June 1, 2013. You'll also find the form at the assessment website at http://www.colostate-pueblo.edu/Assessment/Resources/Pages/default.aspx. Thank you.

**I. Program student learning outcomes (SLOs) assessed in this cycle, processes, results, and recommendations.**

| A. Which of the program SLOs were assessed during this cycle? **Please include the outcome(s) verbatim from the assessment plan.** | B. When was this SLO last assessed? | C. What method was used for assessing the SLO? **Please include a copy of any rubrics used in the assessment process.** | D. Who was assessed? Please fully describe the student group. | E. What is the expected achievement level and how many students should be at it? | F. What were the results of the assessment? | G. What were the department's conclusions about student performance? | H. What changes/improvements to the program are planned based on this assessment? |
|---|---|---|---|---|---|---|---|
| (a) an ability to apply knowledge of mathematics, science, and engineering | Fall 2010 | Specific assignments in EN 211, 231, 361 (BSE only), 460 (BSE only), and 471 (BSIE only). | All students in each course were assessed on their performance on the specified assignment. | Usually 80% achieve 80% or better. See attached table for outcome (a) review. | See report for outcome (a) in appendix. | See report for outcome (a) in appendix. | See report for outcome (a) in appendix. |

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|---|---|---|---|---|---|---|---|
| (f) an understanding of professional and ethical responsibility | Spring 2010 | Specific assignments in EN 101 and 487/488. | All students in each course were assessed on their performance on the specified assignment. | Usually 80% achieve 80% or better. See attached table for outcome (f) review. | See report for outcome (f) in appendix. | See report for outcome (f) in appendix. | See report for outcome (f) in appendix. |
| (i) a recognition of the need for, and an ability to engage in life-long learning | Spring 2010 | Specific assignments in EN 101, 215 (BSIE only), 487/488. | All students in each course were assessed on their performance on the specified assignment. | Usually 80% achieve 80% or better. See attached table for outcome (i) review. | See report for outcome (i) in appendix. | See report for outcome (i) in appendix. | See report for outcome (i) in appendix. |
| (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice. | Spring 2010 | Specific assignments in EN 103, 107, 361 (BSE only), 443. | All students in each course were assessed on their performance on the specified assignment. | Usually 80% achieve 80% or better. See attached table for outcome (k) review. | See report for outcome (k) in appendix. | See report for outcome (k) in appendix. | See report for outcome (k) in appendix. |

Comments:

For each outcome (a)-(k), assessments are done each year in specific courses for that outcome. On a 3-year schedule, the faculty champion for that outcome reviews all the course assessments and creates a summary with the champion's analysis of the assessments. All the faculty then

meet as a group and discuss that analysis. The summary, the faculty champion's analysis, and the faculty discussion are recorded on a form – see appendix for the forms for the above outcomes.

**B. Follow-up (closing the loop) on results and activities from previous assessment cycles. In this section, please describe actions taken during this cycle that were based on, or implemented to address, the results of assessment from previous cycles.**

| A. What SLO(s) did you address? Please include the outcome(s) verbatim from the assessment plan. | B. When was this SLO last assessed? | C. What were the recommendations for change from the previous assessment? | D. Were the recommendations for change acted upon? If not, why? | E. What were the results of the changes? If the changes were not effective, what are the next steps or the new recommendations? |
|---|---|---|---|---|
| (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context. | Spring 2012 | "We all agreed that engineering occurs in a social context and we should talk about these issues with students. We should also give our opinions, with justifications, but be open to other opinions." | We continue to discuss among ourselves issues regarding the impact of engineering and we discuss them as appropriate in our classes. For example, in the past year, we have discussed in class the ongoing issues with the Fukushima nuclear plan. Also, through the PROPEL center activities, we have introduced a great deal of course material and projects on sustainability. | We believe that sustainability offers a strong framework for understanding the impact of engineering solutions. Sustainability has three pillars: economic, environmental, and societal context.<br><br>We introduced sustainability in EN 101 Introduction to Engineering and the improvement in student understanding was demonstrated in pre and post tests; this work is reported in a paper at the ASEE conference in June 2013. |
| | | | | |

Comments:

Appendix

| **Outcome (a)** | | | | |
|---|---|---|---|---|
| **Course** | **Semester** | **Goal Met** | **Notes** | **IE,BSE or both** |
| EN 211 | Fa10 | | Not done | Both |
| | Fa11 | | Not done | |
| | Fa12 | | Not done | |
| EN 231 | Fa10 | Yes | | Both |
| | Fa11 | No | Students were allowed to redo the exam question for a better grade | |
| | Fa12 | Yes | | |
| EN 361 | Sp10 | Yes | | BSE |
| | Sp11 | Yes | | |
| | Sp12 | Yes | | |
| EN 460 | Fa10 | Yes | | BSE |
| | Fa11 | Yes | | |
| | Fa12 | Yes | | |
| EN 471 | Fa10 | | Not done | IE |
| | Fa11 | | Not done | |
| | Fa12 | | Not done | |

**Analysis:** Data supports that we are achieving this outcome.

**Faculty Discussion:** Faculty felt that we were more than adequately meeting this outcome

Jude DePalma

**Outcome f: an understanding of professional and ethical responsibility**

| Course | Semester | Goal met? | Notes | IE, E or both | Instructor | Evidence of continuous improvement |
|---|---|---|---|---|---|---|
| EN101 | Sp10 | Yes | Two multiple-choice questions on ethics (19 out 21 achieved 80% or above) | Both | Yuan | More examples were used to address the concept that some students misunderstood last semester. Accordingly, a higher performace level was observed. |
| | Fa10 | Yes | Two multiple-choice questions on ethics (33 out 38 achieved 80% or above) | Both | Yuan | |
| | Sp11 | Yes | Two multiple-choice questions on ethics (15 out 18 achieved 80% or above) | Both | Yuan | |
| | Fa11 | Yes | Two multiple-choice questions on ethics (37 out 40 achieved 80% or above) | Both | Yuan | |
| | Sp12 | Yes | Two multiple-choice questions on ethics (15 out 18 achieved 80% or above) | Both | Yuan | |
| | Fa12 | Yes | Section 1 -- Two multiple-choice questions on ethics (20 out 23 answered Q1 correctly, and 19 out of 23 answered Q2 correctly) | Both | Bedoya | More case studies to help students understand professional/ethical responsibility. |
| | | Yes | Section 2 -- Two multiple-choice questions on ethics (18 out 21 achieved 80% or above) | Both | Yuan | |
| | Sp13 | Yes | Section1 -- Two multiple-choice questions on ethics (11 out 13 achieved 80% or above) | Both | Yuan | |
| | | Yes | Section 2 -- Two multiple-choice questions on ethics (18 out 21 answered Q1 correctly, and 20 out of 21 answered Q2 correctly) | Both | Bedoya | Keep on presenting case studies to help students to understand professional/ethical responsibility |
| | | | | | | |
| EN440 | Sp10 | | | IE | Wiley | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Sp11 | | | IE | Purswell | |
| | Fa11 | | | IE | Purswell | |
| | Fa12 | | | IE | Purswell | |
| | | | | | | |
| EN486 | Fa10 | No | A quiz on the topics of Engineering ethics. (6 out of 8 achieved 80% or above) | Both | Yuan | More FE-afernoon type of questions were used in the quiz which required a better understanding on engineering ethics. Plan to use more examples to help students clarify the rules related Q6 and Q7 |
| | Fa11 | Yes | A quiz on the topics of Engineering ethics. (12 out of 15 achieved 8 out 10 or better) | Both | Yuan | A couple of examples were discussed in class to address the ethic rules related to Q6 and Q7 in the quiz of Fall 2010. |
| | Fa12 | No | A quiz on the topics of Engineering ethics. (approx. 68% of students scored 70% or above) | Both | Jaksic | A homework including a short paper discussing other professions and their codes of ethics was assigned. Plan to admister a pre-test in the next run. |

***Observations***

In general, the assessment process works well in EN101 and EN486.
EN440 was taught by adjunt faculty. No data was included.

***Faculty discussion***

The faculty discussed about the difference between professional and ethical responsibilties and agreed that this was an uneasy outcome to assess.
The assessment process is working well in general by assessing the outcome at the beginning and the end of the programs.
Two recommendations are made for continuous improvement on this asessment:
1 -- EN440 will be dropped from the assessment list since it has been taught by adjuct faculty and assessed BSIE only.
2 -- The instructor will keep working on improving the performance in EN486 by introducing the pre-test into the module.

Ding Yuan, 6/4/2013

| **Outcome i**: a recognition of the need for, and an ability to engage in life-long learning | | | | | | Evidence of continuous improvement |
|---|---|---|---|---|---|---|
| **Course** | **Semester** | **Goal met?** | **Notes** | **IE, E, or both?** | | |
| EN101 | Fa09 | Yes | "Why is it so important for engineers to commit life-long learning?"92% scored 80% or better. | Both | Yuan | |
| EN101 | Sp10 | Yes | Same question. 95% scored 80% or better. | Both | Yuan | More examples were used to address the importance of life-long learning. |
| EN101 | Fa10 | Yes | Same question. 87% scored 80% or better | Both | Yuan | |
| EN101 | Sp11 | Yes | Same question. 90% scored 80% or better. | Both | Yuan | |
| EN101 | Fa11 | Yes | Same question. 90% scored 80% or better | Both | Yuan | |
| EN101 | Sp12 | Yes | Same question. 83% scored 80% or better. | Both | Yuan | |
| EN101 | Fa12 | Yes | Same question. 78% scored 80% or better | Both | Bedoya | |
| EN101 | Sp13 | Yes | Same question. 92.3% scored 80% or better. | Both | Yuan | |
| EN101 | Sp13 | Yes | Same question. 86% scored 80% or better | Both | Bedoya | |
| | | | | | | |
| EN215 | Fa10 | No | Midterm: "Internet has a lot of information -- and a lot of misinformation. How can you use the Internet as part of a sensible plan for lifelong learning?" Only 67% scored 80% or better. Students lost points for not mentioning the need to evaluate the credibility of a website. | IE | Fraser | |
| EN215 | Fa11 | Yes | Midterm: "Internet has a lot of information -- and a lot of misinformation. How can you use the Internet as part of a sensible plan for lifelong learning?" Only one student lost points for failing to mention the need to evaluate the credibility of a website. | IE | Fraser | |
| EN215 | Fa12 | Yes | | IE | Fraser | |
| | | | | | | |

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|---|---|---|---|---|---|---|
| EN487 and 488 | Sp09 | Yes | All students demonstrated in their senior projects the ability to learn and apply new knowledge, such as learning and using a new computer language, and learning new manufacturing knowledge. | Both | Fraser | |
| EN 488 | Fa09 | Yes | The one student demonstrated the ability to learn and apply new knowledge. | BSE | Jaksic | |
| EN487 and 488 | Sp10 | Yes | All students demonstrated in their senior projects the ability to learn and apply new knowledge, such as new procedures in LabView, robotic controllers, Arena capability, and knowledge on manufacturing processes | Both | Fraser | |
| EN487 and 488 | Fa10 | Yes | All students demonstrated in their senior projects the ability to learn and apply new knowledge, such as managing a real project and Arena techniques. | IE | Jaksic | |
| EN487 and 488 | Sp11 | Yes | All students demonstrated in their senior projects the ability to learn and apply new knowledge, such as programming, forecasting techniques, and new techniques in Arena. | Both | Fraser | |
| EN487 and 488 | Sp12 | | All students demonstrated in their senior projects the ability to learn and apply new knowledge, programming, the use of GPS signals, and application of control theory. | Both | Fraser | |
| EN487 and 488 | Sp13 | | All students demonstrated the ability to learn and apply new knowledge, such a programming new microcontrollers and PLCS, how to intervace new sensors, how to design/build motor drivers, etc. Twelve out of 15 (80%) of students documented in a separate section of their final reports what they learned | **Both** | Jaksic | |

Analysis: The assessment process is generally working well for this outcome. Students in EN 487/488 demonstrate that they can learn new material.

I recommend no changes to the BSE program, the BSIE program, or our assessment methods. We are doing well on this outcome.

Jane Fraser, 30 May 2013

Faculty discussion: We teach life-long learning by our behavior. We stay up-to-date (eg attending ASEE workshops), we do research, and we work on projects with students. 4 June 2013

(k): use techniques, skills, and modern engineering tools necessary for engineering practice

| Course | Semester | Goal met? | Notes | IE, E or both | Instructor |
|---|---|---|---|---|---|
| EN103 | Sp13 | Yes | The mean score goal of 75% was surpassed. Actual score was 95% | Both | DePalma |
| | Fa12 | Yes | The mean score goal of 75% was surpassed. Actual score was 91.3% | Both | DePalma |
| | Sp12 | Yes | The mean score goal of 75% was surpassed. Actual score was 95% | Both | DePalma |
| | Fa11 | Yes | The mean score goal of 75% was surpassed. Actual score was 96.2% | Both | DePalma |
| | Sp11 | Yes | The mean score goal of 75% was surpassed. Actual score was 97% | Both | DePalma |
| | Fa10 | Yes | The mean score goal of 75% was surpassed. Actual score was 91% | Both | DePalma |
| | Sp10 | Yes | The mean score goal of 75% was surpassed. Actual score was 100% | Both | DePalma |
| | | | | | |
| EN107 | Sp13 | | not evaluated | Both | Paudel |
| | Fa12 | | not evaluated | Both | Paudel |
| | Sp12 | | not evaluated | Both | Paudel |
| | Fa11 | | not evaluated - adjunct | Both | Cakdi |
| | Sp11 | Yes | The goal of 80% of students to score at 80% or better was met since 83% of students scored at 80% or better | Both | Cakdi |
| | Fa10 | | not evaluated | Both | Bloxsom |
| | Sp10 | No | 90% goal of completion of the final exam was not met since only 84% of the students completed the final exam | Both | Bloxsom |
| | | | | | |
| EN361 | Sp13 | | not evaluated - adjunct | BSE | Paredes |
| | Sp12 | Yes | The goal of 75% mean score on the assignment was met with 88% actual mean score | BSE | DePalma |

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|---|---|---|---|---|---|
| | Sp11 | Yes | The goal of 75% mean score on the assignment was met with 93% actual mean score | BSE | DePalma |
| | Sp10 | Yes | The mean score goal of 75% was surpassed. Actual score was 87% | BSE | DePalma |
| | | | | | |
| EN443 | Sp13 | | not evaluated - adjunct | Both | Russel |
| | Sp12 | Yes | The goal of 80% of the students to score 80% or better was met. 13 out of 15 students (87%) scored over 80%. | Both | Sarper |
| | Sp11 | | not evaluated - adjunct | Both | Wiley |
| | Sp10 | | not evaluated - adjunct | Both | Wiley |
| | | | | | |

Analysis: The goal was met. There was only one instance in which the goal was not met.

Faculty Discussion: The only "NO" was in EN 107. We think the goal was set unreasonably high. Also, we addressed students' programming skills and ways to improve them.

N. Jaksic

6/4/2013