Program Assessment Report (PAR) on Completed Assessment

Year 1 [2014/2015] ~ Program: Electrical Engineering

1. Which set of PLOs was assessed this academic year (identify each PLO)?

SO (b) An ability to design and conduct experiments, as well as to analyze and interpret data.
SO (d) An ability to function on multidisciplinary teams.
SO (g) An ability to communicate effectively.
SO (k) An ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

2. Describe the assessment activities below. Please provide enough detail to convey the nature of the activities.

Indirect Program-level assessment:
Senior exit survey (see results of survey at end of this PAR). Please note that the average numbers reported would be based on the following Likert Scaling: 1 = Strongly Agree 2 = Agree .... 5= Strongly Disagree).

Direct and course-embedded indirect assessment:

EE 241/241L: Direct assessment: Informal lab reports with scoring rubric; formal lab report with scoring rubric; final lab project, report, and presentation with scoring rubric; ethics report with scoring rubric; ethics presentation with scoring rubric. Course exit survey for indirect assessment.

EE 252: Direct assessment:
(a) in-class group work: calculate built-in voltages and currents in p-n junctions under bias
(b) direct assessment: optical devices (lasers and laser diodes) calculate light output in either case
(c) solar cells: group and individual assessment (eg to calculate efficiency variations at different light inputs

ENGR 254L: Direct assessment: Homework 45% of grade - standard scoring keys; Exams 55% of Grade, standard scoring keys. Course exit survey for indirect assessment.

EE 343L: Direct assessment: Design an Experiment with scoring rubric.

EE 344/344L: Direct assessment: Informal lab reports with scoring rubric; formal lab report with scoring rubric; final lab project, report, and presentation with scoring rubric. Course exit survey for indirect assessment.

EE 346: Oral Communication Rubric – oral presentation; Technical Documentation Rubric – project report; Technical Literature Comprehension – quiz based on technical handouts; Comprehension of Student Presentations – quiz. Course exit survey for indirect assessment.

EE 448: Direct assessment:
(a) class group-work; students divided in groups and were assigned modern engineering applications on wave-guides, power density of traveling and standing waves
(b) direct assessment: formal exams on topics mentioned above
(c) direct assessment: students asked to derive (by themselves) the properties of traveling E-M fields through Maxwell's equations (most successful)

EE 448L: Direct assessment:
Formal and informal lab writeups, student observation.

EE 454: Notebook Evaluation Rubric; Oral Communication Rubric; Written Communication Rubric; Final Presentation Rubric; Professional Practice Paper; Overall Project Assessment Rubric. Course exit survey for indirect assessment.

3. What were the results of the assessment activities?

Senior Survey

Although in general, survey results were overwhelmingly positive with the lowest average score of 2.4 (between Agree and Neutral). The lowest three scores were for the following outcomes:

- Sufficient resources (equipment, lab facilities, computers, were provided to support my major.
  - Comment included: Some labs lacked required materials
  - Comment included: Resources were provided in some classes like circuits, but in the other classes, like Robotics and EM Lab, the resources were limited. Some necessary circuit components were not readily available. Also, equipment, such as multimeters were not easily accessible in some instances.
- The availability of courses made scheduling easy.
- I am more aware of importance of broad education to understand the impact of engineering solutions in a global and societal context.
-

EE 241/241L:

Direct Assessment:

SO (b) Met target of 85% or more of the students at the Acceptable, Good, or Excellent levels. Discuss sources of experimental error and error propagation. Keep copies of Lab 1 for assessment of data analysis.

SO (d) Did not meet target of 85% or more of the students at the Acceptable, Good, or Excellent levels. Have students peer assess for team-working skills. Have faculty assessment of team-working for lab – review ASEE literature for ideas on this. Help students find a group if they do not have one.

SO (k) Did not meet target of 85% or more of the students at the Acceptable, Good, or Excellent levels. Biggest reduction in the number of students meeting the target occurred because students did not upload work to D2L. Better promulgation of deadlines to ensure that students upload work to D2L.

Indirect Assessment: Errors with indirect assessment instrument: Had planned to use the course evaluation's additional questions to obtain an indirect assessment of SOs, but inadvertently switched the Likert scale from the university's course/instructor evaluations (where a "1" was disagree strongly and a "5" was agree strongly, to the complete opposite scale on the additional questions – a "1" was agree strongly and a "5" was disagree strongly). This made the results suspect as some students did not read instructions and others did. This means a "1" may be either strongly disagree (if you did not read directions) or strongly agree (if you did read the directions). Oops. This has to be fixed in the future!

EE 252:

SO (b) did not meet target that 75% or more of the students were at the A, G, and E (Acceptable, Good, or Excellent) levels. More time and emphasis on optical devices is needed; additional class notes beyond textbook needed especially on optical devices as textbook is not clear on this topic; reduce time on p-n junctions, increase time on optical devices.

Comment: textbooks lack in offering needed analysis of current optical devices (laser diodes, solar cells, LED's); there is a need for excess class notes as a supplement to the text.

SO (d) met target that 75% or more of the students were at the Acceptable, Good, or Excellent levels.

ENGR 254L:

SO (g) Both direct and indirect assessment met target that 85% or more of the students were at the Acceptable, Good, or Excellent levels.

EE 343L:

Direct Assessment:

SO (b) Met target that 85% or more of the students were at the Acceptable, Good, or Excellent levels. Direct assessment of student work showed that 11/11 students met or exceeded expectations for this objective – however, as this was the first time I have asked the students to complete this assignment, I have things I want to change to improve the work. Before the lab begins, have students fill out an outline that clearly states a problem that is testable, make a hypothesis, predict an outcome, identify (list) independent and dependent variables and controls, and an outline of an experimental design to test the hypothesis. Review their work before the start of the lab to give them some feedback before they start.

EE 344/344L:

Direct Assessment:

SO (b) Met target that 85% or more of the students were at the Acceptable, Good, or Excellent levels. Biggest issue seems to be with interpretation of data. Give better guidance of what is expected. Discuss sources of experimental error.

SO (g) Met target that 85% or more of the students were at the Acceptable, Good, or Excellent levels. I think that as an EE/CE program, we can back down on the number of courses that strongly support SO(g).

SO (d) Met target that 85% or more of the students were at the Acceptable, Good, or Excellent levels. Have students assess themselves and partners for teamwork skills. Add an assessment item for instructor to assess teamwork skills in lab during project.

Indirect Assessment: Errors with indirect assessment instrument: Had planned to use the course evaluation's additional questions to obtain an indirect assessment of SOs, but inadvertently switched the Likert scale from the university's course/instructor evaluations (where a "1" was disagree strongly and "5" was agree strongly, to the complete opposite scale on the additional questions – a "1" was agree strongly and a "5" was disagree strongly). This made the results suspect as some students did not read instructions and others did. This means a "1" may be either strongly disagree (if you did not read directions) or strongly agree (if you did read the directions). Oops. This has to be fixed in the future!

EE 346:

Direct Assessment:

SO (g) All students scored in the top two rankings. No changes are anticipated in this area of the course.

Indirect assessment supports the results of direct assessment for this SLO

EE 448:

SO (b) Met target that 75% or more of the students were at the Acceptable, Good, or Excellent levels. Help students understand the importance of signal transmission through interface in modern optical devices.

SO (d) Met target that 75% or more of the students were at the Acceptable, Good, or Excellent levels.

SO (g) Met target that 75% or more of the students were at the Acceptable, Good, or Excellent levels.

SO (k) Target not met: 33% of the students were at the Acceptable, Good, or Excellent levels. Major weakness observed in power of traveling and standing waves in finite media; stress.

EE 448:

The student's previous struggles with the equipment have been addressed by a restructure of the course. Now it more directly supports the notorious content of the electromagnetics lecture.

EE 454:

SO (b) 100% of students scored in the top two categories. This year, however, only one student achieved mastery of this SLO. It is suggested that the detailed notebook description and expectations be revised for next year to increase the emphasis on this SLO, as well as the description of the written component of the periodic classroom presentations.

SO (g) All students scored in the top two rankings for this SO. However, closer examination shows the extreme variability in scores for Written Communications (Notebook (g)2 and Final Presentation (g) 1 led to those items falling into the third category summary (Less than 4.0 average), it suggests additional care be taken cultivate better student performance. A better set of expectations for the notebook will be prepared for next semester with additional emphasis on documenting software and a handout on how to communicate ideas to audiences that have different levels of expertise.

SO (k) While 80% of all students scored in one of the two top categories for this SO, there was a high variance in the level of achievement, with one student doing less than acceptable. An examination of transcripts indicate the student with less than acceptable achievement did not take the sophomore level digital lab until this last semester. This is not recommended, and faculty advisors in EE/CE should prevent this. Additionally, a prerequisite for this course should be added for the fall semester Robotics course.

4. Where applicable, outline the steps you will take to make improvements to the program based on the results of assessment activities identified in #3.

See comments within answers to question 3.

5. Are there any new resources needed to make program improvements? If so, please include the resources and provide justification for each in the Budget section of the Annual Report.

In the Annual Report, we will request new equipment to address student concerns expressed in the senior exit survey on the lack of available equipment in labs, and to support SO (b) an ability to design and conduct experiments, as well as to analyze and interpret data, and SO (k) an ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

In the Annual Report, we will request tenure-track faculty line to replace Paul Fahey upon his retirement with an engineering faculty to support continued growth in these current programs and to explore new programs.

Something that would be great is to have a computerized end-of-semester assessment survey (similar to the way the faculty/course evaluations) that could be administered every semester, separate from the occasional faculty/course evaluations. We can then get statistics on student responses for assessment. This would just be a chance for the students to report on whether they agree or disagree that they have met each course learning outcome.

Completed

Ver. 5/3/2015

Physics and Electrical Engineering Department
Computer and Electrical Engineering
Senior Exit Survey
2014-2015 Academic Year

The following data is being collected as part of our on-going self-evaluation process to improve the CE/EE program. Results will be analyzed and reported in terms of group statistics and comments.
Do not put your name on the form.

5 students

Major (circle one) Computer Engineering - 2 Electrical Engineering - 3

For each statement that follows, please indicate your level of agreement. Space is provided on the back for any comments that explain or clarify your answer. Such comments are very valuable to us.

1. I have been provided with a sound body of knowledge in Computer/Electrical Engineering, including classical and innovative theories, engineering design principles, techniques and vocabulary appropriate to an undergraduate degree.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.4	[3]	[2]	[0]	[0]	[0]

2. The amount and level of work in courses was appropriate.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.8	[1]	[4]	[0]	[0]	[0]

3. I am well prepared for employment in my major field.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.8	[1]	[4]	[0]	[0]	[0]

4. I am prepared to enter an appropriate graduate program.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
2.0	[0]	[5]	[0]	[0]	[0]

5. Sufficient resources (equipment, laboratory facilities, computers, etc.) were provided to support my major.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
2.2	[0]	[4]	[1]	[0]	[0]

6. My academic advisor(s) provided me with the necessary guidance and support in planning and completing my program.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.8	[2]	[2]	[1]	[0]	[0]

7. Faculties were readily available for assistance on course work.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.0	[5]	[0]	[0]	[0]	[0]

8. The quality of teaching in my major is good.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.8	[2]	[2]	[1]	[0]	[0]

9. The availability of courses made scheduling easy.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
2.4	[0]	[4]	[0]	[1]	[0]

10. I can analyze, design and implement an engineering problem.

	Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.8	[1]	[4]	[0]	[0]	[0]

11. I have a better ability to apply knowledge of mathematics, science and engineering.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.6 [2]	[3]	[0]	[0]	[0]

12. I have a better ability to design and conduct experiments, as well as to analyze and interpret data.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.8 [1]	[4]	[0]	[0]	[0]

13. I have better ability to design a system, component, or process to meet desired needs.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.6 [2]	[3]	[0]	[0]	[0]

14. I can function more effectively as a member of a multidisciplinary team.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.8 [2]	[2]	[1]	[0]	[0]

15. I have a better ability to identify, formulate and solve engineering problems.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.8 [1]	[4]	[0]	[0]	[0]

16. I am more aware of professional and ethical issues and responsibilities relating to my profession.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.4 [3]	[2]	[0]	[0]	[0]

17. I have a better ability to communicate effectively and am more aware of its importance in my profession.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.2 [4]	[1]	[0]	[0]	[0]

18. I am more aware of importance of broad education to understand the impact of engineering solutions in a global and societal context.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
2.2 [0]	[4]	[1]	[0]	[0]

19. I recognize better the need for and an ability to engage in life-long learning.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.8 [1]	[4]	[0]	[0]	[0]

20. Through my background, education, and professional activities I am more aware and better able to use the techniques, skills, and modern engineering tools necessary for engineering.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.6 [2]	[3]	[0]	[0]	[0]

21. Through my major courses I am aware of importance of technical standards necessary for engineering.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.6 [2]	[3]	[0]	[0]	[0]

22. Through my background, education, and professional activities (like participation in student branch of IEEE, external professional speakers and research/technology literature handouts), I can understand better and relate to contemporary issues and the impact of engineering solutions in a global, economic, environmental, and societal context.

Strongly Agree	Agree	Not Sure	Disagree	Strongly Disagree
1.8 [1]	[4]	[0]	[0]	[0]

Comments (*Please indicate question number.*):

5. Some labs lack required materials.

5. Resources were provided in some classes like Circuits, but in other classes like Robotics and EM Lab, the resources were limited. Some necessary circuit components were not readily available. Also, equipment, such as multimeters were not easily accessible in some instances.

7. Faculty were always willing to help put in extra time to help students, which I am appreciative for.

17. All of the presentations in courses throughout the years has helped me develop stronger communication skills. Even though I do not enjoy presenting, I feel I have improved my presentation skills and it will most likely help out in the future. Also by recording experiments in lab notebooks, writing formal lab reports, and writing project reports, I have been able to improve my written communication skills as well.

Overall, I am very happy with my education here at the University of Scranton. That said, I do have some things that I would offer as constructive criticism.

1. More work in higher level microprocessors would be very, very nice. Assembly language is nice and good, but it should NOT be the sole focus of the curriculum. There should be a lot less reinventing of the wheel when there are cheap, powerful, and readymade alternatives.
2. Ownership of Senior Projects: The senior projects did not feel remotely like there was ownership. They did not allow any real feeling of control of where they went. Seniors should be able to choose their own project.
3. Final Project Teamwork: There should NOT be single person teams for the senior project. Especially when that person is stuck creating circuits from scratch and interfacing with assembly language. Teams should be at minimum two students and possibly even three.

(Continue on back)

~~What CE/EE course(s) do you feel contributed the most to your preparation for a career in engineering or~~ graduate school?

1. EE 350, EE 450, Electronic Circuits 1 & 2.
2. Circuit Analysis I & 2, Control Systems and Computer Interfacing.
3. Circuit Analysis, Electronic Circuits, AutoCAD, Computer Interfacing & Robotics.
4. All the Dr. Z circuit courses/labs. Robotics (though there is room for improvement)

What CE/EE course(s) do you feel contributed the least to your preparation for a career in engineering or graduate school?

1. Intro to Computer Engineering
2. Digital Signal Processing
3. Electromagnetics, Solid State and Digital Systems.
4. Digital Design Lab.

What support courses were important to your preparation?

1. Speech Class
2. Intro to Computer Engineering.
3. Calculus, Differential Equations
4. Any of the physics ones.

What could we have done differently that would have better prepared you for a career in engineering or graduate school?

1. Maybe a little more help/push to get resume done early as well as provide mock interviews early in Senior Year.
2. Maybe in some lab classes, learn how to design some kind of circuit based on initial specifications. I feel like being introduced to the design aspects of engineering would have better prepared me for my career. Also, maybe have the same professor for electromagnetics lecture and lab.
3. Better quality of senior projects. Introduction to PLB design.

What aspects of our program should we NOT change?

1. Presentations
2. I really think the amount of presentations throughout the years helped refine my verbal communication skills. I also enjoyed all of the projects we worked on in Circuits and Robotics.
3. Basically any course Dr. Z teaches is absolutely perfect.

What are your plans for job and/or further education within the next 5 years?

1. Find a job where I can continue to learn and advance my knowledge.
2. In 5 years I hope to maybe work at a job where I can do either electrical circuit design, or be working in automation.
3. My first goal is employment to pay off my loans, followed possibly by a MS and doctorate further down the line.

*Submit to Ms. Rebecca Haggerty (Rebecca.haggerty@scranton.edu) with a notation in your Annual Report that "Program Assessment Report(s) (PAR) has been submitted under separate cover."