Engineering Transfer Program Review Report

Issued December 2017

Authored by ENGR SAC members:

Jenna Bell	FT Instructor
Greg Gerstner	FT Instructor
David Goldman	Department Chair, FT Instructor
Reginald Holmes	FT Instructor
Peter Kazarinoff	FT Instructor
Dan Kruger	FT Instructor
Scott Lowrey	FT Instructor
Tara Nelson	FT Instructor
Todd Sanders	SAC Chair, FT Instructor
Sanda Williams	FT Instructor

Engineering and Industrial Technology Division
Portland Community College

About this Report

- The electronic version of this document contains links (colored blue) to assist in document navigation. For example, here is a link to the Table of Contents on the next page.
- This report was written to follow the format as described by the following document:
  https://www.pcc.edu/resources/academic/program-review/documents/Guidelinesfor2017_18PRs.docx

Table of Contents

1. Program/Discipline Review

A.

What are the educational goals or objectives of this program/discipline? How do these compare with national or professional program/discipline trends or guidelines? Have they changed since the last review, or are they expected to change in the next five years?

The objective of the Lower Division Engineering Transfer (ENGR) program is to offer freshman and sophomore courses in chemical, civil, computer, electrical, environmental, industrial, renewable energy, manufacturing and mechanical engineering. Students typically matriculate to Oregon State University (OSU), Oregon Institute of Technology (OIT), Portland State University (PSU), University of Portland, George Fox University, and Washington State University-Vancouver.

Students intending to matriculate other institutions are also supported. ENGR's objectives are common amongst community colleges that provide transfer engineering courses. The most important aspect of the transfer program is that the courses align with University offerings such that the University's Accreditation Board of Engineering and Technology (ABET) accreditation is not impacted.

B.

Briefly describe curricular, instructional, or other changes that were made as a result of your SAC's recommendations in the last program review and/or administrative response.

The 2011 Program Review Administrative Response had only one Area for Further Consideration: To better integrate results of the Assessment of the Core Outcomes to make improvements. Below is a summary of the 2011 Administrative Response Recommendations for Improvement and actions taken since 2011:

(i) **2011 Recommendation: Expand ENGR Faculty -**

(a) A new position was created jointly with the Manufacturing Department in spring of 2014.

(b) A new faculty member was hired in spring of 2016 to replace a retiring faculty member.

(c) Most ENGR faculty were hired into CTE programs and teach in two departments, and are thus members of two subject area committee (SAC)s. ENGR full-time equivalent (FTE) for 2016-17 is 162, while the two tech programs FTE were 78 Civil and Mechanical Engineering Technology (CMET) and and 115 (Electronics Engineering Technology (EET)) respectively.

(d) The dual-assignment of faculty results in time commitments for Program Reviews being written every two to three years, attending multiple SAC meetings during in-services, and addressing multiple skills assessments each year.

(e) To Address the dual-assignment issue we have found an analog to the ENGR, CMET, EET departments in the Portland Community College (PCC) Business Administration (BA) department. BA offers CTE and transfer courses while administratively providing singular responses to such requirements as Program Review. We will be reviewing their procedures to fit the ENGR, CMET, EET collaboration.

(ii) **2011 Recommendation: Resolve Instructor Qualification Inconsistency -** This was resolved in 2011.

(iii) **2011 Recommendation: Have Instructional Materials Available for all ENGR courses -** This recommendation has not been addressed across the department, but ENGR101, the highest enrolment course with the most number of adjunct instructors is being standardized.

(iv) **2011 Recommendation: Offer new SolidWorks course by fall 2012 -** ENGR105 3-D Modeling and Engineering Graphics was developed as a new course and uses SolidWorks.

(v) **2011 Recommendation: Advise students to earn the AS degree -** Students meeting with faculty advisors are now encouraged to complete the AS as they also complete their requirements for junior-level coursework.

(vi) **2011 Recommendation: Update advising guides on an annual basis -** Advising guides are now online and updated as needed.

(vii) **2011 Recommendation: Address the extra burden that student academic advising places on faculty -** The time necessary for advising ENGR students is a challenge to faculty. Advising for ENGR, EET and CMET students is done by faculty with the Perkins funded Advisor supporting EET and CMET students only. Since the 2011 Administrative Response several different modalities for advising ENGR students have been attempted:

(a) Prescheduled, open, on-campus advising presentations,

(b) Face-to-face walk in advising,

(c) Face-to-face scheduled advising,

(d) Online presentations,

(e) Updated advising guides,

(f) Updated web-resources, as well as

(g) Working with the Advising office for general education advising support.

The current approach includes scheduled one-on-one advising appointments, quarterly advising sessions at each of the four main campuses, and a redesigned ENGR website with updated advising videos.

2. Outcomes and Assessment

Reflect on learning outcomes and assessment, teaching methodologies, and content in order to improve the quality of teaching, learning and student success.

A. Course-Level Outcomes

The college has an expectation that course outcomes, as listed in the CCOG, are both accessible and assessed, with the intent that SACs will collaborate to develop a shared vision for course-level learning outcomes

i.

What is the SAC process for review of course outcomes in your CCOGs to ensure that they are assessable?

There is no SAC process for review of course outcomes in the ENGR Course Content and Outcomes Guide (CCOG)s.

ii.

Identify and give examples of changes made in instruction, to improve students' attainment of course outcomes, or outcomes of requisite course sequences (such as are found in in MTH, WR, ESOL, BI, etc.) that were made as a result of assessment of student learning.

Changes to instruction to ENGR101. ENGR101 is the largest enrollment course in the department and is the only ENGR course taken by all engineering disciplines: Changes include:

(a) Lecture meeting time was changed from twice per week to once per week, resulting in lower homework scores. Instructors feel students did not have the same time to reflect on the assignment and ask questions before the assignment was due. Worksheets and/or class activities were added into the lecture to allow students to attempt homework-type problems to encourage the forming of questions.

(b) Section on static equilibrium and electric circuits was amended with a math review exercise. It was observed that some students had difficulty with solving simultaneous equations and inverse trigonometric functions. A math review exercise was added to the lab portion of the class as an initial assignment. This allowed students the opportunity to recognize topics in which they might need review or practice.

(c) Section on electric circuits; an optional hands-on circuits lab during Week 10. The optional lab is a response to poor results of exam scores on this section.

(d) Section on vectors; introduction of hands-on force table exercise in lab. Students were often found to have difficulty with the abstraction of only having the theoretical relation for vectors. The force tables provide students a physical representation of vectors.

B. Addressing College Core Outcomes

i. Update the Core Outcomes Mapping Matrix.

For each course, choose the appropriate Mapping Level Indicator (0-4) to match **faculty expectations for the Core Outcome for passing students**. (You can copy from the website and paste into either a Word or Excel document to do this update, and provide as an Appendix).

See Appendix D.

C. Assessment of College Core Outcomes

i.

Reflecting on the last five years of assessment, provide a brief summary of one or two of your best assessment projects, highlighting efforts made to improve students' attainment of the Core Outcomes.

One of the best assessments the ENGR SAC has done is assessing Communication (see rubric in Appendix B). Communication for Engineering students is making their calculations clear and easily understandable by others. In industry, even hand calculations are used as documentation for product design. The students start in ENGR101, the first Engineering course taken, and learn the homework format in which they are required to write a Given statement, a Find statement, and then provide solutions. While the overall structure is used by the faculty who teach ENGR courses, there are several nuances that sometimes are faculty-dependent. Through assessing the Communication outcome, the SAC came together as a group to discuss the required parts of the assessment, creating a more consistent experience for the ENGR students regardless of the course or instructor.

ii.

Do you have evidence that the changes made were effective by having reassessed the same outcome? If so, please describe.

The SAC has assessed the Communication outcome more than once. Most of the assessment changes made were from this assessment process (see Section iii). Each time the SAC assesses Communication, the SAC is able to clarify and become more focused on improvement. While this benefits the students, there have not been substantial changes made in the assignments or classroom.

iii.

Evaluate your SAC's assessment cycle processes. What have you learned to improve your assessment practices and strategies?

The assessment rubric used in the 2015-16 academic year utilized four different levels of accomplishment:

1. Beginning or incomplete,
2. Developing,
3. Accomplished, or
4. Exemplary.

Based on the SAC's assessment work during 2015-16, a binary rubric was utilized to assess the same learning outcome in 2016-17 (Appendix C). The change from a 4-level rubric (Appendix B) to this 2-level rubric was completed in order to decrease the variance based upon multiple assessors and their context for assessing individual student work. The SAC decided to move from the 4-level rubric in 2015-16 to a 2-level binary rubric in 2016-17.

iv.

Are there any Core Outcomes that are particularly challenging for your SAC to assess? If yes, please identify which ones and the challenges that exist.

The two Core Outcomes that were most difficult to assess are **4)** Cultural Awareness and **2)** Community and Environmental Responsibility. Exams, Problem Sets, and Lab Reports are some of the main tools used by ENGR instructors to assess student learning. Based upon these tools it is difficult to measure an individual student's Cultural Awareness and Community and Environmental Responsibility.

3. Other Instructional Issues

A.

Please review the data for course enrollments in your subject area. Are enrollments similar to college FTE trends in general, or are they increasing or decreasing at a faster rate? What (if any) factors within control of your SAC may be influencing enrollments in your courses? What (if any) factors within control of the college may be influencing enrollments in your courses?

ENGR has been increasing over the long term. In Academic year 2012-13 enrollment increased 12.9% and has increased each year since, with the exception of 2015-2016 where the enrollment decreased by 1.6%. PCC's overall trend has decreased in this same time frame. See attached Institutional Effectiveness in Appendix E.

The SAC feels that the increase in ENGR enrollment has to do with the increased population in Portland, and a seeming increase in the cultural popularity of STEM. Our department plans to do more outreach to recruit more students from PCC courses.

B.

Please review the grades awarded for the courses in your program. What patterns or trends do you see? Are there any courses with consistently lower pass rates than others? Why do you think this is the case, how is your SAC addressing this?

1. **ENGR211 Statics** has been showing an increase in the percentage of students with a B or higher grade in the last 2 years (2014-15 and 2015-16). This could be due to a significant overhaul of one of its prerequisites, ENGR101 Introduction to Engineering. In 2014-15, ENGR101 was changed to be more rigorous. It is possible that students were made more prepared for ENGR211.
2. **ENGR171 Intro to Digital Logic Design**: Prior to 2014-15, the passing rate was between 92 and 100%. In 2014-15, the passing rate was 80% . In 2014-15, the course was changed to better align with PSU, which increased the rigour of this course. The ENGR SAC feels that the increased rigor and a better alignment with PSU is appropriate.

C.

Which of your courses are offered online and what is the proportion of on-campus and online? For courses offered both via DL and on campus, are there differences in student success? If yes, describe the differences and how your SAC is addressing them.

ENGR100 Exploring Engineering is the only class ENGR offers online. This class is a one-credit class that is graded as a Pass / No Pass. In this class, students learn about engineering and what it involves. We recommend that students register for ENGR100 when they are considering this field, but may not ready to commit to the program. The passing rates for ENGR100 are 70% for the online section and 90% for the lecture. The face-to-face course is graded primarily on attendance and participate in an activity. The online course is graded in a similar way, but requires making time and room to participate in online discussions. One reason the online course could have lower success might be due because students working from home might not be in "school" mode when they sign up for the course. Another reason could be that the perceived amount of work for online courses may be significantly lower than the amount of actual work they require.

D.

Has the SAC made any curricular changes as a result of exploring/adopting educational initiatives (e.g., Community-Based Learning, Internationalization of the Curriculum, Inquiry-Based Learning, etc.)? If so, please describe.

1. ENGR101 has an Internationalization Initiative wherein there is a study abroad section being proposed for the summer quarter of 2019-20 for at least 18 students. This section would include a 5-week period in which the CCOGs of ENGR101 are taught through the prism of Japanese-specific engineering. For example, the statics of the temples and bridges in a Japanese garden in Kyoto, or the materials and production of samurai swords. This is be followed by a 2-week capstone trip to Japan in which students will visit Japanese gardens, a samurai sword production facility, and Japanese seismic engineering sites. They will also get to see presentations from Japanese engineers. After the trip, the students will have a 1-week follow-up in which the students will assess and reflect on their experience and the course. This study abroad trip is in collaboration with Takako Yamaguchi, FDC of the Sylvania Japanese Department who plans to include students from (a) JPN course(s). The proposal for this trip will be submitted in the 2017-18 school year.

2. ENGR101 has evolved to an experiential learning course with competitions in miniature parachute designs, construction and implementation. There was also an egg drop for the entire campus in the Sylvania CC building in the spring of 2017.

3. ENGR221 Electrical Circuits 1- Certain sections have implemented a 'flipped' classroom model.

E.

Are there any courses in the program that are offered as Dual Credit at area High Schools? If so, describe how the SAC develops and maintains relationships with the HS faculty in support of quality instruction.

ENGR100 Exploring Engineering has been offered as a Dual Credit course since 2014-15. An initial training has taken place for the first group of instructors. Additional training will be provided at the annual Dual Credit Symposium and upon request. A shared computer drive is used to access developed materials. The Dual Credit liaison visits the high schools annually for assessment of classroom instruction.

A Humanitarian Engineering Camp was provided to 20 Beaverton middle-school students in the summer of 2017. This camp was funded through the EXPrESS Grant of the Higher Education Coordinating Commission (HECC) and the PCC Foundation. An outline of a 3-credit course with 10 week-long modules has also been completed. This course, currently in development with Health Studies and Environmental Center Faculty, has also been proposed as a dual credit course for area high schools. The Health Studies, Environmental Center and ENGR Faculty also plan to offer the Humanitarian Engineering Camp in a more evolved form in 2018 and beyond. The intentions are to include student internships, projects, mentorships and partnerships with organizations such as Mercy Corps, Green Empowerment, and Engineers Without Borders.

F.

Please describe the use of Course Evaluations by the SAC. Have you developed SAC-specific questions? Has the information you have received been of use at the course/program/discipline level?

The SAC has not developed SAC-specific questions for Course Evaluations.

4. Needs of Students and the Community

A.

Have there been any changes in the demographics of the student populations you serve? If there have been changes, how has this impacted curriculum, instruction or professional development?

1. The racial and gender demographics of ENGR students at PCC show similar trends to engineering programs across the US (link to National Science Foundation (NSF) report). The age of the ENGR students, however, does not; the student population tends to be older. Over half (51%) of our students are over 25 years old.
2. In 2015-16, 65% of our students identified as "Caucasian." This is a reduction since 2011, when the number was nearly 80%, although it is a higher percentage than the average of 48.4% for 2-year institutions across the US (link for 2014, the latest year for which data was available from the NSF). The percentage of students of color at PCC has grown consistently each year, with the greatest increases among African-American (106% growth) and Multi-race (95% growth) students.
3. Engineering is a predominately male-dominated profession. ENGR gender demographics are 20% female and 80% male, which is consistent with the national average of college students (link to NSF report). Similarly, the gender demographics of the engineering and engineering technology faculty at PCC demonstrate similar ratios: there are only three full-time female instructors out of 10.
4. The number of students enrolled in the ENGR department increased each year since the last program review, with the exception of a dip in the last year, putting pressures on the resources students use to be successful. Student FTE for ENGR was 111 in 2011-12. In 2015-16, the FTE was 142.

B.

What strategies are used within the program/discipline to facilitate success for students with disabilities? If known, to what extent are your students utilizing the resources offered by Disability Services? What does the SAC see as particularly challenging in serving these students?

PCC Testing offers an optional Accommodated Testing service to assist faculty in providing the accommodations approved by a Disability Services Counselor. Students use the accommodations from the Disability Services, which include:

(i) an aide to read and/or transcribe (write) the test

(ii) extended testing time

(iii) a distraction-reduced site for testing

(iv) special equipment (such as a word processor or CCTV)

(v) adjustable workspace

ENGR students make use of the testing center at Sylvania, which is a great resource for both students and faculty. Students who require testing accommodations can take their tests in the testing center. However, scheduling can be challenging, as it may require students to make arrangements outside of class time. When students are given extended time, they may miss lecture content. This scheduling can be difficult in laboratory classes where some stations have portable equipment as well as adjustable benches and adjustable chairs. ENGR faculty are willing to help students succeed and accommodate students with disabilities in various ways. One of the faculty writes out lecture notes during lecture using a LiveScribe pen. The notes are then uploaded to Google Drive for students to access outside of class.

C.

What strategies are used within the program/discipline to facilitate success for online students? What does the SAC see as particularly challenging in serving online students?

1. The ENGR department offered courses through Interactive Video Conferencing (IVC) for many years. However, this type of long distance course offering was stopped in 2015 due to technical difficulties during class time and the limited communication with the students.

2. ENGR100 is the only online course currently offered in the ENGR department. Offering ENGR classes via long distance is rather challenging due to the laboratory sections and equipment required by most classes. This is a national and international problem for engineering programs. Currently, virtual labs and compressed weekend labs are being explored by other schools.

3. To accommodate students that have external, non-academic commitments, we offer many classes both during the day and evening. While most of the ENGR classes are taught at the Sylvania campus, ENGR100 Exploring Engineering is offered both in-class and via distance learning.

D.

Has feedback from students, community groups, transfer institutions, business, industry or government been used to make curriculum or instructional changes (if this has not been addressed elsewhere in this document)? If so, describe.

PCC ENGR faculty and staff are constantly soliciting feedback from groups inside and outside the college to continuously improve our curriculum and course offerings.

1. **ENGR221, 222, and 223 -** Instructors connected with staff at both OSU and PSU and concluded that Fourier Transforms no longer needed because all students would go through it again with a 300-level course.
2. **ENGR114 -** This course was completely overhauled and resurrected in spring of 2015 to align with PSU's curriculum. Since then, it has been accepted by other schools' curricula and become very popular. It is now offered nearly every term, often with multiple sections.
3. **ENGR105 -** new course developed to align with the transfer institutions.
4. **ENGR101 lab -** updates better align with the CCOG and to increase the hands-on skills of the students.

5. Faculty: reflect on the composition, qualifications and development of the faculty

A.

Provide information on how the faculty instructional practices reflect the strategic intentions for Diversity, Equity and Inclusion in PCC's Strategic Plan, Theme 5. What has the SAC done to further your faculty's inter-cultural competence, and creation of a shared understanding about diversity, equity and inclusion?

1. One ENGR faculty participated in the Social Justice for Faculty Workshop in spring 2016.
2. ENGR participated in the Diversity Internship program in 2014-15. Through this participation, we successfully trained and hired the intern as an adjunct. This intern worked for 4 terms before being hired for a non-teaching role at PCC on another campus.
3. Two ENGR faculty and the Dean participated in and NSF funded Women Tech Educators Online Training Fellowship in 2014-15. The fellowship was run by National Institute for Women in Trades, Technology and Science (IWITTS). This fellowships was free for participants.
4. PCC joined the newly created Oregon Council for Engineering and Related Technical Education (OCERTE) with the goal of aligning engineering curriculum for students who transfer credits to different academic institution.
5. Scott Lowrey and Reg Holmes participated in Engineering Projects in Community Service (EPICS) conference at Purdue University in the summer of 2017. Here, they learned about programs for increasing student engagement through technical service projects for local and international groups.
6. In January 2017, Sanda Williams attended the Intercultural Communication Workshop at PCC's Southeast Center.

B.

Report any changes the SAC has made to instructor qualifications since the last review and the reason for the changes. (Current Instructor Qualifications at: http://www.pcc.edu/resources/academic/instructor-qualifications/index.html)

There have been no changes to the instructor qualifications since the last program review.

C.

How have professional development activities of the faculty contributed to the strength of the program/discipline? If such activities have resulted in instructional or curricular changes, please describe.

1. In January 2016, two faculty members attended a Flipped Classroom Conference at Harvey Mudd College. Most of the attendees were in Engineering or other STEM related field. Following the conference, the faculty flipped their ENGR courses. This mode of teaching supported the students by giving them time to learn content while at home and then practice the content in the classroom with the support of the instructor.
2. Faculty involvement with NSF through grant reviews strengthens the connection between ENGR Department faculty, the NSF and PCC.
3. Faculty are to present at the HI-TEC 2017 conference, Salt Lake City.
4. In March of 2016 Sanda Williams and Greg Meyer attended the VentureWell Conference

6. Facilities, Instructional and Student Support

A.

Describe how classroom space, classroom technology, laboratory space, and equipment impact student success.

1. **ENGR231 -** lab equipment in AM103 is an integral part of the course. It provides hands-on learning opportunities for students. Lab equipment and staff support for materials science sample preparation and testing. This includes furnaces, polishing equipment, microscopy equipment, and testing equipment.
2. **ENGR226 -** New equipment purchased in fall 2017 replaced 20 year old machines. The technology in the new equipment makes use much easier. As a result, students are asking "how" does one pursue a surveying degree?
3. **ALL ENGR equipment** is shared with the CMET and EET (Technology) programs
4. **ST316 -** A third electronics lab was added and the other two electronics labs were remodeled with improved benches, power capacity, lighting and drop-down ventilation to facilitate soldering.
5. **AM103 -** added an aquaponics farm.
6. **ENGR114 -** designed, prototyped, built and tested a solution to automate the aquaponics garden using engineering programming and teamwork.
7. The CTE Instructional Support Technicians are an invaluable resource, supporting ENGR lab activities in the same manner as they support CTE lab activities.

B.

Describe how students are using the library or other outside-the-classroom information resources (e.g., computer labs, tutoring, Student Learning Center). If courses are offered online, do students have online access to the same resources?

1. **HP202** is the official Engineering Science Resource room, i.e., tutoring space.
2. **AM101** is the MakerLab a prototyping and 3-D printing center open for educational and outreach purposes.
3. **Library** Computers have the "ENGR" package of software installed to provide students with access to software when labs are not open.

C.

Does the SAC have any insights on how students are using Academic Advising, Counseling, Student Leadership and Student Resource Centers (e.g., the Veterans, Women's, Multicultural, and Queer Centers)? What opportunities do you see to promote student success by collaborating with these services?

Although the department is not formally tracking student interactions with various student services there have been a few observations

- **Veteran's Resource Center -** Lunch Learn regarding advising for Engineering Transfer presented by Engineering Faculty hosted at the VRC. Personal introduction for students by Engineering Faculty to peer mentors and VRC coordinators as well to the Vet Success on Campus coordinator. Due to faculty connections in the VRC, students have been connected directly with departmental advising and resources. Some peer mentors in the VRC have been very successful engineering students and offered tutoring support to their fellow students.
- **Multicultural Center -** Through faculty initiated support, students have been referred to the Sylvania Campus Multicultural Center's Men of Color Leadership Program, and students within that program have been directly referred to departmental advising and support for engineering.

7. (Omitted: Section only relevant for CTE Programs)

8. Recommendations

A.

What is the SAC planning to do to improve teaching and learning, student success, and degree or certificate completion, for on-campus and online students as appropriate?

1. **Create Open Educational Resources -** Textbook costs in Engineering are high. It is common for Engineering textbooks to be between $200 to $300. Many publishers update their textbooks every 2 or 3 years, making used books obsolete. Sadly, many of the changes are a new color scheme and shuffling of the homework problems numbers. There is a limited amount of quality OER content in Engineering. But the SAC feels that reducing the textbook costs for our students are important.
2. **Offer more classes in a hybrid model -** Engineering courses are currently only offered at the Sylvania campus. A hybrid model would be a good way to maintain the connection students have in face-to-face classes, while providing more flexibility for students.
3. **Expand summer offerings** - in particular ENGR101. Historically we have offered ENGR101 during fall, winter and spring terms. ENGR101 is a required course for all future ENGR courses. Students ready for ENGR101 in fall term cannot start the three-course Electrical Fundamentals sequence (ENGR221, 222, and 223), until winter term.
4. **Increase student diversity -** Looking through the five years of data available from Institutional Effectiveness, our students are nearly 60% white each year. We would like to increase the number of diverse students. The SAC would also like to see more women enrolled in Engineering courses. This is an area we have seen improvement. According to Institutional Effectiveness data, in 2012-13 14.2% of our students were female, whereas in 2016-17 19.3% are female. We are heading in the right direction, but a percentage that was more inline with the college would be preferred. In order to increase student diversity, the SAC will need to devote time and resources to intentionally improve the experience of students of color and women.
5. Request tutoring funds
6. Larger computer room for better teacher / student interaction
7. Increase advising options
8. Engineering image onto library computers

B.

What support do you need from administration in order to carry out your planned improvements? (For recommendations asking for financial resources, please present them in priority order. Understand that resources are limited and asking is not an assurance of immediate forthcoming support, but making administration aware of your needs may help them look for outside resources or alternative strategies for support.)

1. **Support for advising -** Engineering students take a specific set of courses. Each student meets with a faculty member to create a specific plan for them. Each University and each discipline has their own set of requirements. For example a mechanical engineer transferring to PSU takes many of the same courses as a student transferring to OSU, but the programs are not identical. Therefore, students can easily waste time and credits taking courses that are not transferable.

   In addition to mechanical engineering, we also support students in civil, electrical, industrial, chemical, environmental and renewable engineering. We have created and maintain advising guides for each of these programs (link to Electrical and Computer Engineering Advising Guide). This requires a good working relationships between our SAC and and OSU.

   Advising the ENGR students is important, but takes a tremendous amount of time. Last year 2016-17, 243 students attended 37 advising sessions. Faculty also spent over 300 hours providing advising to new and current students. Each meeting was 30 minutes or longer. While ENGR is technically a lower-division transfer program, it is helpful to think of it like a Career Technical Education program. Students could benefit from a dedicated advisor much like the Perkins advisors. The ENGR SAC feels that a dedicated advisor for 50% of the time would be ideal to supporting and retaining our students.

2. Formal continued support of the MakerLab Coordinator as a long-term position.

3. Support encouragement for ENGR faculty to be part of the state-wide initiative to produce ENGR majors in the State of Oregon.

4. Organizational acknowledgment that shows formal support of the ENGR100 and the PCC faculty in ENGR that serves as the point person for ENGR100.

5. An instructor image on ENGR Classroom computers that includes video capture software. Video capture software would help support the hybrid model the ENGR SAC wants to use in more courses.

6. SolidWorks in the Library in support of ENGR105.

7. There are no dedicated funds for tutoring ENGR students. In 2016-17 student tutors hours were paid through the HECC Express grant. Other years ENGR students haven't had access to tutoring. In fall 2017, the Student Learning Center has hired student tutors who are ENGR students. While, this is tremendous there are still limited tutoring availability.

8. The SAC has some data on retention for ENGR students. Through the HECC grant, there was a study on retention of ENGR101 students and the likelihood of those students returning. However, the data that shows persistence is harder to get. We do know that nearly 300 students take ENGR 101 each year. Unfortunately, we don't have a solid understanding of what happens to the students beyond this course. Access to more data would help us understand our program better to address shortfalls.

9. Larger computer room for better teacher / student interaction. Our computer room has 24 seats. This limits the size of the classes we can offer. The room is also small for 24 seats. The current configuration has one large aisle with computer tables on the side. There is not a lot of space between the rows, which virtually limits faculty access to students who sit 2 or 3 seats from the aisle. A new, larger computer room would be ideal. However, re-configuring the space so there are 2 aisles instead of one may provide more access and meet the needs.

A. Abbreviations and Acronyms

ABET Accreditation Board of Engineering and Technology

BA Business Administration

CCOG Course Content and Outcomes Guide

CMET Civil and Mechanical Engineering Technology

CTE Career-Technical Education

EET Electronics Engineering Technology

ENGR Lower Division Engineering Transfer

FTE full-time equivalent

HECC Higher Education Coordinating Commission

IVC Interactive Video Conferencing

NSF National Science Foundation

OIT Oregon Institute of Technology

OSU Oregon State University

PCC Portland Community College

PSU Portland State University

SAC subject area committee

B. 4-level rubric used to assess college core outcome: Communication in 2015-16

Rubric for evaluation of proper Communication using Engineering Problem Format

	1 Beginning or incomplete	2 Developing	3 Accomplished	4 Exemplary	Score
Mechanics	Wrong Paper Writing on both sides of paper Doesn't use proper section headings (Given, Find, Solution)	Uses proper ENGR paper Proper section headings sometimes used and underlined Some Solutions boxed	Uses ENGR paper All problems only on 1 side of paper Most Headings used and underlined Most Solutions Boxed Most problems start on their own page	Uses ENGR paper All problems only on 1 side of paper All Headings used and underlined All Solutions Boxed All problems start on their own page	
Given	Problem statement is started, but is not complete. Important details are missing	Problem statement is provided Statement seems to have most important details Statement is not clear	Problem statement mostly complete. There are a few minor details missing Statement is clear	Complete statement. Explains entire problem and text is not needed for additional information Includes all given diagrams/ figures Statement is clear	
Find	Statement is missing or incorrect	Statement is unclear as to what will be solved	Statement is mostly complete and clear. It may require some additional information to fully understand what is being solved.	Clear and complete statement of what is being solved.	
Solution	Necessary diagrams missing Many steps are missing, incorrect, or not able to be followed	Most necessary diagrams given Not all steps are clear and logical Steps are hard to followed Some major steps missing	Appropriate necessary diagrams Steps are mostly clear and logical Steps can be followed, but not always easily Some minor steps are missing	Appropriate necessary diagrams Steps are clear and logical Steps are easy to follow All steps are shown	
			6/16	Total (16 points maximum)	

C. 2-level Rubric Used to Asses College Core Outcome: Communication in 2016-17

Instructions given to students about the format they must follow:

Problems presented in order
Written clearly in pencil on engineering calculation paper
Headings must be underlined
Solutions must be boxed
The Given statement: problem statement from the text. It must include enough information to recreate the problem without the use of the text.
The Find statement: what you are looking for.
Solution: must show a clear/ logical evaluation process, including a free-body diagram when applicable, with a boxed final answer.
One question per page
Use the face of the engineering pad only
To do
Add Zero column
Mechanics - illegible/ unreadable, problems out of order

ENGR College Core Outcome: Communication Binary Assessment Rubric		
Criteria	**YES**	**NO**
Is the assignment on engineering calculation paper?		
Is the writing only on the front side of the paper?		
Is the writing done in pencil?		
Are the problems completed in order?		
Does each problem start on a new page?		
Does each page include the student's name?		
Does each page include the class (either name or number)?		
Does each page include a page number?		
Is the page number in the x of n (or X/N) format?		
Are appropriate section headings used?		
Are section headings underlined?		
Are the solutions boxed?		
Is there adequate white space for readability?		
Could you read everything on the page?		
Is the paper free of smudges, debris, etc?		
Is the problem number shown?		
Is there at least one sentence that describes the problem in words?		
Is the written description adequate without the use of the text?		
Are all given diagrams/figures included?		
Are all given diagrams/figures included without any alteration or additions?		
Are all given quantities clearly identified?		
Are all given quantities clearly identified?		
Is there at least one sentence identifying what is to be found?		
If a variable is declared is it clear what that variable represents?		
Is the find statement complete?		
Is it clear what is to be found in the solution to the problem?		
Is the solution clearly separated from the problem statement?		
Are there clear steps in the solution?		
Are all the major steps to the solution included?		
Do the solution steps follow a logical progression?		
Are any assumptions clearly identified?		
Are all necessary diagrams included? (FBD, Schematic, etc.)		
Is the diagram complete? (All forces, etc)		
Are necessary references included? (coordinate system, labels, etc.)		
Are appropriate units included?		

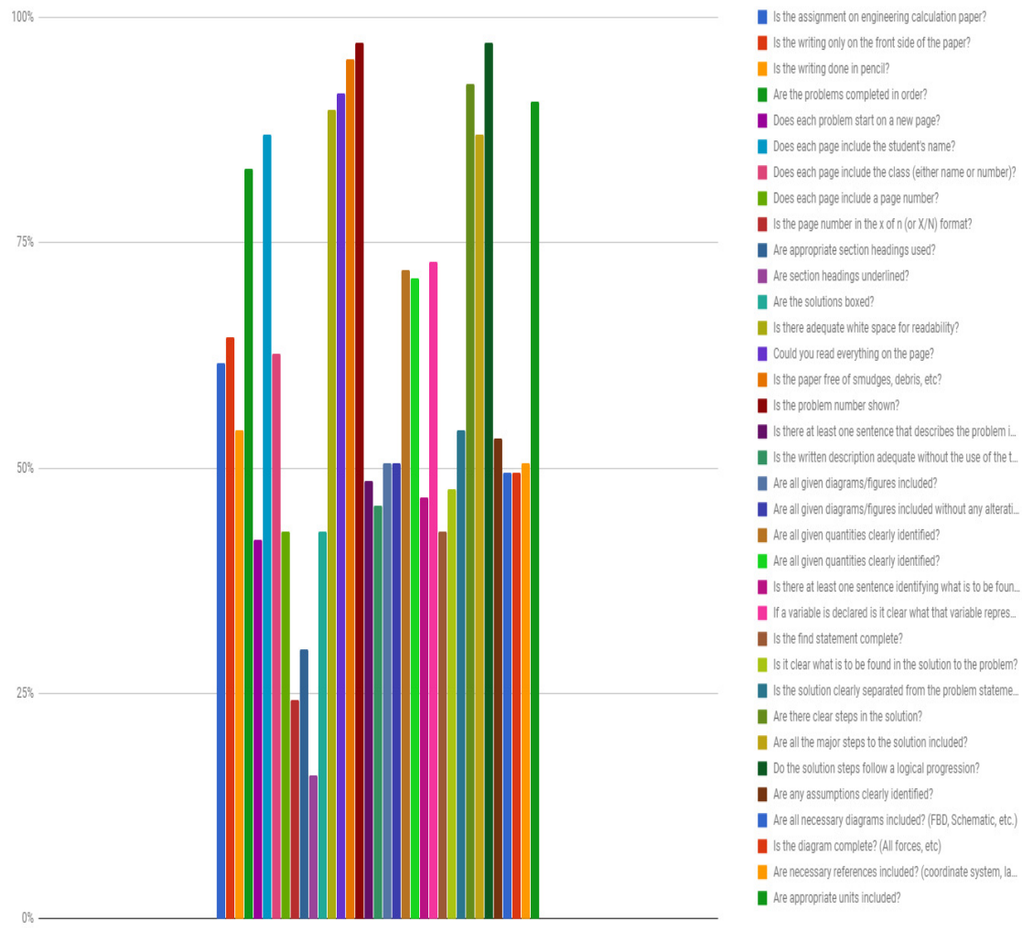

Figure 1: Bar Chart of Assessment Responses

D. ENGR Course Mappings to Core Outcomes

Course #	Course Name	CO1	CO2	CO3	CO4	CO5	CO6
ENGR 100	Exploring Engineering	2	3	2	2	1	4
ENGR 101	Engineering Fundamentals	4	3	4	1	4	2
ENGR 102	Engineering Graphics	3	0	4	2	3	1
ENGR 105	3-D Modeling and Engineering Graphics	3	0	4	2	3	1
ENGR 114	Engineering Programming	2	1	4	1	4	2
ENGR 171	Introduction to Digital Logic Design	2	1	4	1	4	3
ENGR 211	Statics	2	1	4	1	4	3
ENGR 212	Dynamics	2	1	4	1	4	3
ENGR 213	Strength of Materials	4	2	4	1	4	2
ENGR 221	Electrical Circuits I	3	2	4	0	4	2
ENGR 222	Electrical Circuits	4	2	4	0	4	2
ENGR 223	Electrical Circuits III	4	2	4	0	4	2
ENGR 226	Plane Surveying	4	1	4	1	4	3
ENGR 231	Material Science	4	1	4	1	4	2
ENGR 262	Manufacturing Processes	2	2	4	1	3	1
ENGR 271	Digital Logic Design	2	1	4	1	4	3

	Core Outcomes
1	Communicaton
2	Community and Environmental Responsibility
3	Critical Thinking and Problem Solving
4	Cultural Awareness
5	Professionsal Competance
6	Self-Reflection

E. Institutional Effectiveness Data

Program Review Data Profiles

Collegewide and Campus FTE and Headcount by Subject

Click on down arrow at right to type subject into [Search area] or select subject from drop down list.

Engineering-ENGR

FTE Totals by Subject Area

Campus	2012-13	2013-14	2014-15	2015-16	2016-17
College-wide	127.8	132.8	145.6	141.8	162.1
Sylvania	127.8	132.8	145.6	141.8	162.1

FTE 1 Yr % Change by Subject Area

Campus	2012-13	2013-14	2014-15	2015-16	2016-17
College-wide	15.4%	4.0%	9.7%	-2.7%	14.4%
Sylvania	15.4%	4.0%	9.7%	-2.7%	14.4%

Headcount Totals by Subject Area

Campus	2012-13	2013-14	2014-15	2015-16	2016-17
College-wide	690	710	768	756	726
Sylvania	690	710	768	756	726