

End of Year Assessment Report for Programs

Program: Bachelor of Science in Engineering

Semester/year: Spring 2019

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Program Mission Statement

Engineering Program strives to provide students with quality education in engineering in a caring Christian environment.

Program Objectives

At the close of their degree, students should be able to:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (GU SLO 2).
2. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (GU SLO 2).
3. an ability to communicate effectively with a range of audiences (GU SLO 4)
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts (GU SLO 5)
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives (GU SLO 3)
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (GU SLO 2).
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies (GU SLO 1).
8. a commitment to serve the world with passion and integrity that stem from Christian mind and characters (GU SLO 6).

Assessment Methods and Benchmarks – SPRING SEMESTER

Program Objective	Introducing	Developing	Mastering
PO1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (GU SLO 2).	<i>ENGR 101 - Not taught this semester</i>	<i>ENGR 308 - Not taught this semester</i>	<i>ENGR 401 - Not taught this semester</i>
	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$
PO2. an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (GU SLO 2).	<i>ENGR 101 - Not taught this semester</i>	<i>ENGR 308 - Not taught this semester</i>	<i>ENGR 401 - Not taught this semester</i>
	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$
PO3. an ability to communicate effectively with a range of audiences (GU SLO 4)	<i>ENGR 101 - Not taught this semester</i>	<i>ENGR 301 – Project Presentation</i>	<i>ENGR 402 - Not taught this semester</i>
	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$
PO4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts (GU SLO 5)	<i>ENGR 101 - Not taught this semester</i>	<i>ENGR 360 - Not taught this semester</i>	<i>ENGR 409 - Not taught this semester</i>
	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$
PO5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives (GU SLO 3)	<i>ENGR 101 - Not taught this semester</i>	<i>ENGR 301 – Teamwork</i>	<i>ENGR 402 - Not taught this semester</i>
	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$
PO6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions (GU SLO 2).	<i>PHYS 200 - Not taught this semester</i>	<i>ENGR 230 - Not taught this semester</i>	<i>ENGR 332 - Not taught this semester</i>
	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$
PO7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies (GU SLO 1).	<i>Not Applicable</i>	<i>ENGR 360 - Not taught this semester</i>	<i>ENGR 409 - Not taught this semester</i>
	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$	Benchmark: $\geq 75\%$

PO8. Serve with passion and integrity stem from Christian mind and characters (GU SLO 6).	<i>ENGR 101 - Not taught this semester</i>	<i>ENGR 360 - Not taught this semester</i>	<i>ENGR 409 - Not taught this semester</i>
	Benchmark: >=75%	Benchmark: >=75%	Benchmark: >=75%

Assessment Findings – SPRING SEMESTER

PO1.

- A. Introducing: ENGR 101 - Not taught this semester
- B. Developing: ENGR 308 - Not taught this semester
- C. Mastering: ENGR 401 - Not taught this semester

PO2.

- A. Introducing: ENGR 101 - Not taught this semester
- B. Developing: ENGR 308 - Not taught this semester
- C. Mastering: ENGR 401 - Not taught this semester

PO3.

- A. Introducing: ENGR 101 - Not taught this semester
- B. Developing: ENGR 301 – Project Presentation – students had to present the outcomes of their Design Project to the class. Students gain an experience in sharing the results of their work with peers and faculty that translates into future Capstone Project participation. On the Project Presentation 6 of 6 students (100%) met the objective with a score of 75% or better.
- C. Mastering: ENGR 401 - Not taught this semester

PO4.

- A. Introducing: ENGR 101 - Not taught this semester
- B. Developing: ENGR 360 - Not taught this semester
- C. Mastering: ENGR 409 - Not taught this semester

PO5.

- A. Introducing: ENGR 101 - Not taught this semester
- B. Developing: ENGR 301 - Teamwork Assignment – students had to evaluate their team and themselves while completing Design Project together. Students gain an experience in teamwork that translates into future Capstone Project participation. On the Teamwork Assignment 6 of 6 students (100%) met the objective with a score of 75% or better.
- C. Mastering: ENGR 401 - Not taught this semester

PO6.

- A. Introducing: PHYS 200 - Not taught this semester
- B. Developing: ENGR 230 - Not taught this semester
- C. Mastering: ENGR 332 - Not taught this semester

PO7.

- A. Introducing: N/A
- D. Developing: ENGR 360 - Not taught this semester
- E. Mastering: ENGR 409 - Not taught this semester

PO8.

- A. Introducing: ENGR 101 - Not taught this semester
- B. Developing: ENGR 360 - Not taught this semester
- C. Mastering: ENGR 409 - Not taught this semester

Analysis of Assessment Findings – SPRING SEMESTER

Engineering program at Greenville is currently approaching the end of the third year. The courses offered to the students represent a combination of introductory and intermediate level classes. The following are introductory level courses: ENGR101 (Fall 2017), ENGR201 (Spring 2018) and ENGR 240 (Spring 2018). Intermediate level classes are ENGR 250 (Spring 2018) and ENGR 301 (Spring 2018). Engineering program at GU continues to follow ABET student outcomes which constitute Engineering Program Objectives with an addition of Greenville's Christian mission objective. 2018-2019 changes in ABET SLOs were reflected in the syllabi for the 18-19 courses and this document. Students' recommendations via FCARs were incorporated into the courses previously run by the Department (ENGR 240, 250, 301 etc.).

Following the suggestions in FCAR for ENGR201 from Spring 2017, the number of the topics studied was reduced from four to two. This allowed for more in-depth learning of Robotics and 3D modeling. Students' feedback indicated better response comparing to the previous course. Overall Summative Rating went from 3.5 to 4.3 and Challenge and Engagement Index – from 4.5 to 5.7. However, further Engineering Curriculum development partially inspired by the feedback requires modification in the design stream sequence. ENGR 201 was eliminated and ENGR 301 will partially fulfil the requirements for ENGR 201 (3D modeling).

ENGR240 ran for the second time with all course objectives were met. Students feedback via FCAR in Spring 2018 indicates slower first half of the class which would benefit from slightly faster pace. The suggestion was implemented in Spring 2019 and no students' concern expressed in FCAR for SP2019. As the sequence of programming courses has changed in the new engineering curriculum closer monitoring will be required.

ENGR 250 ran for the second time with all course objectives were met. Students feedback via FCAR indicates the course went well in general.

ENGR301 was offered for the second time with all course objectives were met. Students feedback via FCAR back in Spring 2018 indicates that the course was well received. Suggested modifications included (2018) potential slight increase in pace for initial SolidWorks training and allocation of additional time for Design Project (Final Design phase). The suggestions were implemented in Spring 2019. Students expressed less concern on the amount of time allocated to the Design Project. However, some concern still remain accompanied by the students' suggestion to space the workload better at the end the semester, which will be address the following academic year.

Sharing and Discussion of Assessment Findings – SPRING SEMESTER

FACT (Faculty Assessment and Continuous Improvement Team) has met during Spring 2019 semester (May 13th) to assess provisional engineering program without any FCARs yet available. The achievements of the Program and concerns following 2018-2019 academic year were discussed. Possible improvements to the program and pedagogy were shared. Here are the findings discussed at FACT and Curricular Committee meetings:

1. Two to three engineering students will be ready to graduate in May 2020 (first group of students).
2. Head of the Department, Dr. Choi is on Sabbatical during the academic year 2019-20 and Dr Probst will assume the leadership.
3. Course descriptions must be updated by May 24th.

ENGR 240:

The objectives of the course were met (apart from Objective 5 – being close to meet 75% benchmark with actual 73%), which is confirmed by group's performance. Based on the students' feedback and their grades, most of the students found the course reasonably challenging (not too much) and commented about their experience in the positive way. Adjustment to the pace going through the first half of the course (suggestion made in SP 19) was beneficial and should be kept moving forward. However, students' comments suggested that amount of feedback on readiness assessments was not sufficient. Another suggestion indicates "less reading and more examples".

ENGR 250:

Compared to last year that was taught by another instructor, the instructor added more detailed contents in the "Shear and Bending Moment Diagram" topic, which includes more detailed "Area Method" and "Comprehensive Method". Because all students finished calculus II and physics I & II, overall, the teaching experience was good.

ENGR 301:

The objectives of the course were met which is confirmed by group's performance. Based on the students' feedback and their grades, most of the students found the course reasonably challenging and commented about their experience in the positive way. However, students' comments suggested large number of lectures. While it's deemed necessary to deliver the course related materials, making it more interactive (incorporating practical examples) would be appropriate. Following the recommendations from Spring 2018 an additional time was allocated at the end of the semester to tackle Design Project (modelling part), which benefited the students.

ENGR 399.01

Overall, the instructor felt that the students left this class with a brief understanding of a field of engineering that they would not have otherwise encountered, and it was better received than expected.

ENGR 399.02

The objectives of the course were achieved based on overall students' performance/grades. For the objectives 1, 4 and 5, two students didn't meet 75% benchmark but gained 68% (combined Mid Term and Final Exams grade). Mid Term Exam grades for the students, which had to take ENGR 399.02 Machine Design and Manufacturing concurrently with ENGR 399.IND Manufacturing Processes were significantly lower and below 70% comparing to the students, which took ENGR 399.01 Manufacturing Processes during the previous semester. It was evident that students who didn't take ENGR 399.01 before struggled with the material in ENGR 399.02 more in the first half of the class lacking prior knowledge. It was a first time this course was offered to GU engineering students. Apart from the above the course was well received overall and especially hand-on activities such as sheet metal project and CNC machining. However, meaningful feedback should be provided more often.

Use of Assessment Findings for Program Improvement (Action Plan) – SPRING SEMSTER

The following suggestions/recommendations were made for program improvement:

ENGR240:

Based on the students' recommendations, it's suggested to keep the pace at which the first half of Spring 2019 class was run. Providing additional feedback on Readiness Assessments is recommended as one of the key elements of the course. Moving forward, keep monitoring incoming students' experience (prior participation in MATLAB programming class). Readiness assessments, which do require reading the course textbook are deemed necessary and suggestion of replacing them with practical examples was considered and rejected as counterproductive. It's recommended to keep this element of assessment, which requires reading the textbook.

ENGR250:

The class went well in general, there were a few times that the instructor could not finish a "big" example problem in one class, and some student mentioned that he/she may forgot the previous steps in the next lecture. Also, some of the students mentioned that there should be more homework assignments, however, from some students' feedback during the semester, the homework load is already somehow a little heavy for them.

- Continue improving the teaching skill.
- Keep improving the in-class example problems demonstration, especially find a way to get dynamic feedback from students during the semester.
- Polish the homework problems and make more home-made problems.

ENGR301:

This semester the class consisted of students with mixed abilities (typical) and experiences (not that typical). Some students in the group had previous SolidWorks and Design Methodology knowledge/experience, while the others (33%) didn't. This introduced complexity in helping these two groups of students within the class, which wasn't a major issue due to small class size (6 students). Moving forward, Spring 2018 class should be used as a benchmark for changes/approaches to teaching Engineering Design next Spring (2020).

ENGR 399.01

Time spent covering environmental regulations could be reduced or integrated with the design portion to better hold the students interests. Expansion upon the sustainability portion to better cover all aspects (environment, social, & economic) would be a benefit. The life cycle

cost portion could be improved with better examples. The students reacted well to the presentation assignment and had some very unique and educational ideas, this could be expanded upon.

ENGR 399.02

Based on limited amount of students' response to Evaluation it's recommended to provide more feedback on assignments. ENGR 399.01 Manufacturing Materials should be considered as a prerequisite to ENGR 399.02 Machine Design and Manufacturing.

Full Year Reflection – FALL/INTERTERM/SPRING TERMS

The data collected during the Fall and Spring semesters of 2018-2019 academic year provided fruitful feedback from our students and is deemed as mostly fair reflection of their needs. Further development of individual courses and the engineering program as a whole is anticipated based on the actions proposed. Program learning objectives were met in each of the courses offered in both semesters, yet further improvements are expected (reflected in the action plan). Continuous improvement of data collecting system is necessary to adhere to ABET (Engineering accrediting body) standards. This will be done in consultation with external experts and implemented by FACT (Faculty Assessment and Continuous-Improvement Taskforce) made up of Physics and Engineering faculty.

Supporting Documents

The FCARs for the following courses are used in the analyses above: ENGR 240, ENGR250, ENGR 301, ENGR 399.01 and ENGR 399.02 for Spring 2019. Two FACT meeting minutes (2018-2019) and other documents are available upon request.