

# Petroleum Engineering - Bachelor of Science - Mid-Cycle Review & SLOA Year

Current Compliance Year: 2022-2023

Mid-Cycle review

## Recent Recommendations

Feedback will include recommendations from the last Expedited Review or from your most recent review by your school or college. You may not see any feedback or recommendations until you have completed your first full or mid-cycle review.

### Response to Previous Recommendations (if any):

Actions and plans to increase enrollment

- Chancellor's Big Box of Ideas "Encourage the Governor and/or the legislature to provide tax incentives (industry) or other incentives (state agencies) for hiring PETE grads".
- Contacted CTCs process technology program to tap into their pool that want to pursue a BS in PETE.
- Our outreach plans in local area high schools were stalled given the pandemic. These require an in-person presence to make a real difference because virtual events are basically ineffective. Now that the restrictions are lifted, we plan to leverage the newly recruited lab assistant and a post-doc that are working on CO2 sequestration projects to do some real demonstrations to grade schoolers in spring 2023.
- We also have a similar plan in which CEM recruiter, [REDACTED] will team up with industry professionals, local PETE Industry Advisory Board (IAB) members and the SPE and AADE officers to visit Anchorage area grade schools.
- Very recently, we also strengthened the PETE IAB by adding three new members to bring in new ideas as well as team up on outreach visits.

Actions and plans for online offerings/options

- The new ES100X Engineering Alaska course may persuade some high schoolers to major in petroleum engineering (PETE faculty have contributed to this module).
- Offer PETE101 (Fundamentals of Petroleum, Drilling and Production) through the North Star College.
- Many PETE courses are already offered online.
- In fall 2022 every lecture in a gateway PETE301 course is intentionally recorded to develop this into an offering through eCampus.

## Student Learning Outcomes

The previous Student Learning Outcomes Assessment has been submitted as its own report. Going forward you will use the following prompts to discuss the success of your most recent SLOA plan and address your assessment activities since your last SLOA report (typically the past two years or since your last program review).

### Learning outcomes feedback from last review:

*Feedback will be provided once you have completed a full or mid-cycle review.*

**Discuss your SLOA findings, changes you are making and what you hope to see as a result:**

- As part of the EAC's ABET accreditation, Student Outcomes (SOs) which describe what students are expected to know and be able to do by the time of graduation, are routinely assessed. These relate to skills, knowledge and behaviors that students acquire as they progress through the program. As seen in the documented SLOA plan we employ both (1) direct and (2) indirect methods. Direct assessments are based on student work (e.g. embedded exam, quiz, homework questions) while the indirect assessments are based on senior exit surveys. Outcomes assessments are done by each and every faculty.

- The SO results for a (2 year) cycle are processed and collated in a non-attainment graph using holistic performance indicators, which readily shows instances of attainment below 70% threshold in the exemplary and proficient categories combined for all the SOs. The non-attainments are flagged and all the results are collectively discussed in faculty meetings, which triggers Continuous Improvement (CI) actions (e.g., altered pedagogies, course modifications, curricular changes) in a collaborative fashion.

- For e.g., non-attainment in SO1 (complex engineering problems) has been a fairly routine occurrence (seen in last 2 cycles). Therefore, faculty placed emphasis on improving the attainment of SO1 (material balance equation in reservoir engineering). Following the execution of CI actions, the SOs are re-assessed in the next cycle to determine the effect. In this manner we "close" the CI loop. It is important to note that student quality plays a crucial role in the entire SO assessment and CI process.

**Discuss the curricular changes made based on assessing your SLO. If you haven't made any curricular changes, please explain why not and address what you did notice in the review, including strengths of your curriculum through the assessment of your outcomes:**

As a direct result of the SO assessment and CI process the BS PETE curriculum has been re-designed and undergone the following curricular changes that are effective from catalog year 2022-2023:

- PETE101 reduced to 2 credits.
- PETE201 (Future Trends in the Oil and Gas Industry) a new 1 credit course that covers diverse topics and fills the void between PETE101 and PETE301.
- STAT300 is now a REQUIRED course given the importance of Data Analytics.
- STAT300 is also a new pre/co-requisite for PETE421 and PETE456.
- PETE F469 (Enhanced Oil Recovery and Reservoir Simulation) is a new course that combines the erstwhile PETE466 and PETE489.
- Students now chose one elective course (instead of two) from a list of six approved (meaningful) electives.

**Are communication outcomes embedded in the SLOA Plan?**

As of 2017 all Baccalaureate programs were required to embed the communication outcomes within their SLOA Plans, this is optional for non-Baccalaureate programs.

Not Embedded

## Student Success

To access the Student Success Dashboard please sign into a UA computer with VPN connection (if not on campus). You will need your UA credentials and it is best accessed with the most updated version of Chrome, Edge, Firefox or Safari browsers; Internet Explorer is not supported. You will need to filter the data to see your programs. If you need assistance in finding the data for your programs, please contact your data liaison or [Julia Manfredini](#) in the PAIR office.

## Data Liaisons

Each school or college has a team of Data Liaisons to help you analyze the data provided in the portal and may be able to help you see your data in multiple contexts. You can find a list of data liaisons on the resources page for Program Review.

The college or school level committee will also have access to this data with the goal that by providing these visualizations data availability will be increased.

Data supplied within the dashboard linked below is intended for Academic Program Review and not for any other purpose.

## Student Success Data Dashboard

### Previous Feedback

*Feedback will be provided once you have completed a full or mid-cycle review.*

### Student Success Data Trends:

|                                                                                                   |
|---------------------------------------------------------------------------------------------------|
| Equity gaps, Decline in majors, Decline in SCH, No change in pass rates, No change in persistence |
|---------------------------------------------------------------------------------------------------|

**If equity gaps were found in any of your disaggregated student success data, please explain how you plan to address those gaps. Please contact your data liaison or make an appointment with [Julia Manfredini](#) to learn more about analyzing your data.**

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| Out of the six different categories, Gender, Pell-Eligibility and First-Generation Status do not indicate any particularly alarming trends and the average Persistence Rates are in the 75-80% range, and as a matter of fact FY21 to FY22 is approaching nearly 100%. The trend is also somewhat similar in the Ethnicity category with the exception of sudden drop to 50% in the FY21 to FY22 Persistence Rate; note though that this was 100% in the prior two consecutive years. Although quite a bit of fluctuation is observed in the Race category, barring some exceptions the Persistence Rate averages to 75%. This fluctuation narrows down in the Age category and for the most part the Persistence Rate averages to 75-80%. In summary, we do acknowledge the aforementioned trends and will monitor in the future to bring the Persistence Rate to 100%. The plan to address these equity gaps will involve the students' academic advisor as well as the department chair advising/counseling or intervening in the case of the perceived, vulnerable students. Note though that for the most part, we have and continue to have a strong track record of ensuring that our students successfully complete the programs. |
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### Optional Data Explanation

Feel free to share more of your thoughts on the data provided.

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| Decline in Majors and SCH: Enrollments in petroleum engineering, in general, have declined, which also has direct proportionality with SCHs. Petroleum engineering enrollments all across the country have seen precipitous drops and UAF is certainly not an exception. These are mainly attributed to the volatility of oil (and gas) prices and something new is the emergence of “energy transition” and consequently (and unfortunately) the wrong public perception of the oil and gas industry as a whole.<br>No Change in Pass Rate: As per the PR table that shows the average course pass rate, from year to year we have maintained an average of 95+%, which appears to be highest in CEM.<br>No Change in Graduation-Informed Persistence: As per the GIP table, from year to year a decline in persistence is seen in FY19 to FY20 to 72.3%; however, a steady increase all the way upto 89.3% is seen in FY21 to FY22, but overall the change is not very dramatic. Also, when we compare our GIPs with the rest of the BS cohort within CEM, our data falls in between the CEM lows and highs. |
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## High Impact Practices

According to the AAC&U, High-Impact Educational Practices “have been widely tested and have been shown to be beneficial to college students from many backgrounds.” UAF is particularly interested in Undergraduate Research and/or Scholarly Activity because it is one of our mission fulfillment indicators, but all of these researched High-Impact Educational Practices should be reflected in your program’s student learning outcomes and curriculum.

### Previous Feedback

*Feedback will be provided once you have completed a full or mid-cycle review.*

### High-Impact Practices Used in this Program

Please use the following fields to discuss how your program is using the high-impact practices, successes and known issues and solutions, or ways you are considering incorporating them in the future. If you are not using any of the high-impact practices listed, please use the “Other or None of These,” field to share what your program is doing to help students be successful.

### High Impact Practices that currently apply to your program:

Writing-Intensive Courses, Diversity/Global Learning, Capstone Courses and Projects, Internships, Undergraduate Research

### Other or None of these (explain)

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## Submission

### Submitter & Collaborator Names

Abhijit Dandekar, Santanu Khataniar, Mohabbat Ahmadi, Obadare Awoleke and Yin Zhang

### Submitter Email

adandekar@alaska.edu

## College or School Review Committee

The college or school committees set the tone for helping each program feel seen during this process. We have provided you with strength-based feedback tags to attach to this program review. Please select as many as applicable.

### Overall Recommendations

Increase enrollment, Develop online offerings/options

### Explanation of Recommendations

Continue developing online gateway courses and recruitment efforts.

### Student Learning Outcomes Assessment Feedback (tags)

Strong alignment with SLOA plan

### Student Learning Outcomes Assessment Feedback (narrative)

Your report shows strong direct and indirect measures for each outcome and good discussion on ways to increase enrollment and on building more online courses. While there is good discussion of curricular changes, it is useful to describe the reasons why, such as to increase majors and graduates or to be more sustainable, etc.

### Profile Feedback

### Financial Feedback

### Student Success & Equity Feedback

The program addresses the student success data trends and equity gaps. The committee appreciates the plan for addressing these equity gaps that involves the student's academic advisor and the department chair advising/counseling or intervening in the cases of the perceived, vulnerable students.

### High-Impact Practices Feedback

The committee appreciates the way that the program has incorporated high impact practices into the program, and the way that they were described in the report.

UNIVERSITY OF ALASKA FAIRBANKS  
**Student Learning Outcomes Assessment Plan**  
**Bachelor of Science in Petroleum Engineering**  
 College of Engineering and Mines

Date May 7, 2021

| Expanded Statement of Institutional Purpose                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Intended Objectives/Outcomes                                                                                                                                                                                                                    | Assessment Criteria and Procedures                                                                                        | Implementation (what, when, who)               |
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| <b>MISSION STATEMENT:</b><br>The mission of the Petroleum Engineering Program is to provide its students with quality education and training in the field of Petroleum Engineering through effective teaching, research and public service, with emphasis on Alaskan petroleum resources.<br><br><b>GOAL STATEMENT: Prepare students with the following Program Educational Objectives (PEOs)*:</b><br><ol style="list-style-type: none"> <li>Our graduates will apply their technical knowledge and data analytics skills and have successful careers in the oil and gas industry analyzing real-world petroleum engineering problems, developing innovative solutions underpinned by data, and communicating these to meet the needs of multiple stakeholders within the global community.</li> <li>Our graduates will demonstrate professionalism, commitment to ethical standards, and lifelong learning through continuing professional development during their careers.</li> <li>Our graduates will contribute significantly to the global petroleum engineering profession and they will exemplify the behaviors, including integrity, empathy,</li> </ol> | (1) an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.                                                                                                  | DIRECT (embedded assignments): using rubrics based on key performance indicators for PETE301; 407; 426; 466, 476; 487A&B. | Every offering by pertinent course instructor. |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                 | INDIRECT: graduating senior exit survey.                                                                                  | Every year, coordinated by ABET coordinator.   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (2) an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.                   | DIRECT (embedded assignments): using rubrics based on key performance indicators for PETE456; 487A&B.                     | Every offering by pertinent course instructor. |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                 | INDIRECT: graduating senior exit survey.                                                                                  | Every year, coordinated by ABET coordinator.   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (3) an ability to communicate effectively with a range of audiences.                                                                                                                                                                            | DIRECT (embedded assignments): using rubrics based on key performance indicators for PETE303, 411 and 487A&B.             | Every offering by pertinent course instructor. |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                 | INDIRECT: graduating senior exit survey.                                                                                  | Every year, coordinated by ABET coordinator.   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (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. | DIRECT (embedded assignments): using rubrics based on key performance indicators for PETE456, 481 and 487A&B.             | Every offering by pertinent course instructor. |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                 | INDIRECT: graduating senior exit survey.                                                                                  | Every year, coordinated by ABET coordinator.   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | (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.                                                 | DIRECT (embedded assignments): using rubrics based on key performance indicators for PETE456 and 487A&B.                  | Every offering by pertinent course instructor. |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                 | INDIRECT: graduating senior exit survey.                                                                                  | Every year, coordinated by ABET coordinator.   |

Submitted by: Abhijit Dandekar

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| tolerance and respect and fair dealing, necessary to become industry leaders within and beyond Alaska. | (6) an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions. | DIRECT (embedded assignments): using rubrics based on key performance indicators for PETE301, 302, 303, 411, 421, 478 and 487A&B. | Every offering by pertinent course instructor. |
|                                                                                                        |                                                                                                                                                  | INDIRECT: graduating senior exit survey.                                                                                          | Every year, coordinated by ABET coordinator.   |
|                                                                                                        | (7) an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.                                              | DIRECT (embedded assignments): using rubrics based on key performance indicators for PETE101 and 487A&B.                          | Every offering by pertinent course instructor. |
|                                                                                                        |                                                                                                                                                  | INDIRECT: graduating senior exit survey.                                                                                          | Every year, coordinated by ABET coordinator.   |
|                                                                                                        | (8) an understanding of northern issues.                                                                                                         | DIRECT (embedded assignments): using rubrics based on key performance indicators for PETE101 and 487A&B.                          | Every offering by pertinent course instructor. |
|                                                                                                        |                                                                                                                                                  | INDIRECT: graduating senior exit survey.                                                                                          | Every year, coordinated by ABET coordinator.   |

*\* These are our most upto date (as of February 2021) PEOs that reflect the criterion requirements “there must be a documented, systematically utilized, and effective process, involving program constituencies, for the periodic review (every 2-3 years) of these PEOs that ensures they remain consistent with the institutional mission, the program’s constituents’ needs, and these criteria”.*

## Communications Plan Submittal Form\*

Degree Title: [BS Petroleum Engineering](#)

Department: [Petroleum Engineering](#)

School or College: [College of Engineering and Mines](#)

Contact Information: [Abhijit Dandekar](#), [adandekar@alaska.edu](mailto:adandekar@alaska.edu), 474 6427

Proposed Action on Communication Plan:

☒ Degree will retain existing courses previously designated O, O2, O/W, W, etc.

- Please attach an explanation of how those courses are meeting the communication learning outcomes and how students will be required to take those particular courses.

☐ Degree is submitting a new, complete communications plan at this time.

- Please attach new plan.

☐ Program/Department plans to submit a more detailed Communication Learning Outcomes plan, but will:

☐ Retain the existing courses while a new plan is drafted (if you intend to keep current O/W designations past the Fall 2017 implementation date).

- Please attach an explanation of how those courses are meeting the communication learning outcomes and how students will be required to take those particular courses.

☐ Submit a preliminary plan now and submit a completed plan by [Click here to enter a date](#).

- Please attach preliminary plan and an explanation of what the program/department will do to submit a completed plan by the above date.

UAF Communications Outcomes (Motion passed at Faculty Senate Meeting #210):

UAF undergraduates will demonstrate effective communication when they are able to:

- Explain disciplinary content using a variety of modes of communication, including oral and written communication.
- Communicate to audiences in the discipline using appropriate disciplinary conventions.
- Translate disciplinary content to audiences outside the discipline as appropriate, making disciplinary knowledge relevant to broader communities.
- Integrate feedback from others to enhance or revise communication.

\*\*Explanation on next page.

\* This form is NOT required. It is offered as an aid to programs and academic councils as they create, submit, and review communications plans Spring of 2016.



**Explanation of how existing courses, which are required in the degree program, meet the Communication Learning Outcomes**

1. Engineers use a variety of modes of communication. Written communication includes brief periodic reports and final project reports such as in the senior capstone design course, and laboratory reports in the two laboratory courses in the program. Oral communication includes design review meeting, periodic presentations, and final project presentations typically using PowerPoint in the senior capstone design course. Our "O" and "W" courses require these means of communication.
2. One level of communication in the "Oral" and "Writing" classes is the technical competence level of engineers in the discipline, i.e., they have to "technically" know something to be in a position to communicate or convey the idea, concept etc.
3. Another level of communication in the "Oral" and "Writing" classes is broad, low level, introductory remarks on the need for the project, identifying the major issues to be solved, and the general scope of the solution proposed that makes the knowledge relevant to broader communities, which can be achieved by the ability to communicate effectively.
4. Feedback is obtained from the course instructor on the written communication (for example grading a lab report and draft report) and from the class audience and the instructor on oral presentations. Both are achieved through key performance indicators based rubrics.

**The courses used for written communications in the discipline are:**

PETE303, PETE411 and PETE senior capstone design (PETE487B). These three courses are required for the degree program. Other required courses in the discipline also inculcate writing skills, examples of these are PETE370 (which has a laboratory component) and PETE421.

**The courses used for oral communications in the discipline are:**

PETE senior capstone design (PETE487B). This is a required course for the degree program. Other required courses in the discipline also focus on oral communications skills which build up to the larger oral communication requirements in the above course. These include PETE101 and PETE421.

**Prerequisites:**

Both PETE303 and PETE411 have pre-requisites of WRTG F111X; WRTG F211X or WRTG F213X, whereas PETE487B has pre-requisites of COJO F131X or COJO F141X; WRTG F111X; WRTG F211X or WRTG F213X.

**Assessment Plan for Oral and Written Communications**

| Assessment Criteria and Procedures                             | Implementation<br>(what, when, who)               |
|----------------------------------------------------------------|---------------------------------------------------|
| Senior Capstone Design Project evaluated using standard rubric | Yearly by course instructors                      |
| PETE303 and PET411 using standard rubric                       | Every spring by the respective course instructors |
| Senior Exit Survey                                             | Typically every May conducted by department chair |

\* This form is NOT required. It is offered as an aid to programs and academic councils as they create, submit, and review communications plans Spring of 2016.