1. Assessment information collected
   
   As part of the EAC’s ABET accreditation process, learning outcomes which describe what students are expected to know and be able to do by the time of graduation, are routinely assessed. These relate to the skills, knowledge and behaviors that students acquire as they progress through the program. The EAC repackaged the student outcomes (typically referred to as “a – k” to “1” – “7”; an additional unique outcome for the BS program is “l” or “8” on Northern Issues) recently. Accordingly the PETE BS program in earnest adopted the new student outcomes and altered the student outcomes assessment plans in fall of 2017. Since this SLOA covers AY2016-2017 and 2017-2018, the SLOA plan documents both student outcome sets “a – l” as well as “1 – 8”. Although, the new student outcomes are less in number and are identified by numerals, the assessment data that is collected has not changed, which basically falls into two categories (see SLOA plan): (1) direct and (2) indirect. Direct assessments are based on student work (e.g. embedded exam, quiz, homework questions) while the indirect assessments are based on senior exit surveys. It is worth mentioning here that the student outcomes assessment plans and the results were readily accepted by the EAC of ABET visit team when the BS program was reviewed in fall 2017. Finally, it should also be noted that since the current student outcomes are new and have been recently adopted and assessed and evaluation cycle is not yet complete, much of the conclusions drawn and the curricular changes reported here are based on the old “a” – “l” student outcomes.

2. Conclusions drawn from the information summarized above

   (1) Direct outcomes assessment indicates that although most of them are achieved at or above the threshold of 70%, improvement is certainly warranted in key outcomes such as “a”, “e” and “j” (see Figure 1). Similarly, as far as new student outcomes are concerned, outcome “1”, which is akin to a sum of outcomes “a” and “e” is also achieved at a fairly low level, albeit this is based on just one course (see Figure 2).
   
   The curricular changes in order to bring out future improvement in higher achievements of outcomes “a”, “e” and/or “1” are in the following section

   (2) As shown in Figure 3 and 4 the exit surveys indicate that at the time of graduation, students are generally satisfied with the level of outcomes achievement, which averages in the range of strong. Finally, something that needs to be noted though is the fact that a comparison of direct and indirect outcomes assessments overall aligns quite well with each other, indicating the consistency.
3. Curricular changes resulting from conclusions drawn above

(1) Our philosophy for student outcomes assessment and continuous improvement through curricular or other changes is rooted in the literal meaning of the word “continuous,” that is, the process carried out on an ongoing or regular basis, irrespective of how minor the actions taken may be, as indicated by the frequency shown in the SLOA plan.

(2) The improvements made by individual faculty members based on the outcomes assessments, taken as a whole or in its entirety or as an aggregate, are basically contributions to overall program improvement since they focus on specific skill developments, inculcation of knowledge, and attitude and behaviors.

(3) During the reporting period two specific events, namely dedicated program faculty meetings in September 2016, and May 2017, earmark the in-depth discussion of assessed and evaluated student outcomes (e.g., see plots shown in previous section), exit surveys, and faculty introspections for continuous improvement. Examples of some of these are provided next.

(4) PETE faculty identified that the low achievement of outcomes “a” and “e” were mainly due to the challenging reservoir engineering course (PETE476) in the curriculum. Providing students with past exam solutions, formation of study groups, well inflow and outflow performance relations, gas lift and calculations, and continued emphasis on better understanding of material balance are examples of curricular changes. Similarly, PETE faculty decided to include the “application of conventional tools to unconventionals,” i.e., include specific assignments in the three key classes PETE 407, 426, 476 as well as in PETE 481 in order to address the somewhat low achieving outcome “j”.

(5) Other actions are based on indirect feedback such as surveys and/or curricular experiences of PETE faculty given the students’ performance. Examples of those include: (a) making PETE489 (reservoir simulation) more hands-on; (b) introducing unique internship opportunities to students (given the low oil price environment), and example of this is the reoffering of PETE458 through which 5 students will travel to PR of China to intern at the Shengli oilfield for one month in the summer of 2018.

(6) A cumulative effect of all the above is continuous quality improvement of the petroleum engineering BS program, which we know has been effective and is clearly demonstrated by the continued EAC of ABET accreditation that is the most rigorous.

4. Identify the faculty members involved in reaching the conclusions drawn above and agreeing upon the curricular changes resulting

Primarily, Abhijit Dandekar (PETE chair and ABET coordinator). Other PETE faculty (Santanu Khataniar, Mohabbat Ahmadi, Obadare Awoleke, Yin Zhang and Vahid Atashbari) are involved in the outcomes assessment in their respective courses and the curricular changes is a result of collective faculty decision.

5. Has your SLOA plan been updated to include assessment of the program’s Communication Plan, as required by Faculty Senate motion? (required for baccalaureate programs only)
Refer to our comprehensive communications plan (addressing the FS Motion) that was submitted in fall 2017; it is not repeated here.

**Figure 1:** Direct outcomes assessments based on embedded assignments in various PETE courses from AY2016-2017.

**Figure 2:** Direct outcomes assessments based on senior capstone design (PETE487A&B) from AY2017-2018.
Figure 3: Summary of graduating senior exit surveys conducted in May 2017. The 3.5 markers indicates outcome ability/understanding between Average and Strong.

Figure 4: Summary of graduating senior exit surveys conducted in May 2018. The 3.5 markers indicates outcome ability/understanding between Average and Strong.