1. Assessment information collected

As part of the EAC’s ABET accreditation process, outcomes “a – l”, 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 data that is collected 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. Since the last ABET visit in fall of 2011, the outcomes are assessed only for the key courses such as petroleum reservoir rock and fluid properties (formative assessment); rock and fluid properties laboratory (formative, mainly for written communication); reservoir, drilling and production engineering (all three being the key disciplines/skill areas in petroleum engineering for summative assessment) and ultimately the culminating senior design experience (also for summative assessment). Note that PETE101 is an exception, in that we use this only to assess outcome “l” on northern issues since students in this class are exposed to this particular understanding right from the beginning. We also recognize the challenge in directly assessing outcome “f” quantitatively based on courses, but beginning with freshmen class of PETE101, an entire lecture module is dedicated on “petroleum engineering as a profession including associated industries”. Additionally, using “professional conduct” and “professional interaction” as two of the key performance indicators to observe the behaviors of our students clearly indicate that almost all of them fall into the exceptional and at least acceptable categories.

2. Conclusions drawn from the information summarized above

(1) Direct outcomes assessment indicates that for the most part they are met at a fairly high level with most of the students (~85%) falling in the exemplary or exceptional and proficient categories (see example shown in Figure 1 and 2).

(2) As shown in Figure 3 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. As a matter of fact, for almost all outcomes an increase in the level of achievement is seen when data from 2015 and 2016 are compared.

(3) Something that needs to be noted though is the fact that a comparison (Figure 1 vs. Figure 3) of direct and indirect outcomes assessments aligns quite well with each other, indicating the consistency.
3. **Curricular changes resulting from conclusions drawn above**

   (1) Based on the outcomes assessments in the identified courses, instructors make their own modifications to effect continuous quality improvement for applicable outcomes (see example in **Figure 2**, which indicates that the area of improvement that needs to be focused on is locating and using published materials and recognizing the limitations of the software, i.e., outcomes i and k respectively).

   (2) 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) PETE101 as a new pre-requisite for PETE302; (b) MATH253X as a new pre-requisite for PETE476; (c) PETE489 and PETE431 offering swapped between fall and spring (students who do a capstone design based on reservoir simulation no longer have to wait until the graduating semester and this way they’ll have experience using the software for their senior design); (d) senior capstone design course (PETE487A) pre-requisites changed to: Senior standing; PETE F407 or PETE F426; PETE F476" (typically by the end of junior year students complete at least PETE426 and PETE476, which are key discipline specific courses that are utilized in the capstone design).

   (3) A cumulative effect of all the above is continuous quality improvement of the petroleum engineering BS program.

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 (Shirish Patil, Santanu Khataniar, Mohabbat Ahmad, and Obadare Awoleke) are involved in the outcomes assessment in their respective courses and the curricular changes is a result of collective faculty decision.

---

**Figure 1**: Direct outcomes assessments (except f) based on embedded assignments in various PETE courses from AY2014-15 and 2015-16.
Figure 2: Key performance indicators for outcomes b, g, i and k (source – PETE 303, spring 2016).

Figure 3: Summary of graduating senior exit surveys conducted in May 2015 and May 2016 respectively that cover AY2014-15 and 2015-16 respectively.