

**Institutional Effectiveness Report
2020-2021**

Program: Chemical Engineering BS

College and Department:

SLO 4. *ETHICS* – an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgements, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.

SLO 5.

3. *Course Level Assessment:* (Every term a course is taught). The Department uses selected courses to learn about student performance at the different levels of the curriculum, refer to the current "Articulation Matrix" table shown two pages from here. Course-level assessment is done every term in which the course is taught and an Overview is assembled every third year. Those overviews are used to continuously improve the course and curriculum as a whole and are discussed with the departmental faculty and appropriate actions taken.
4. *Co-Op Report Assessment:* (Semi or annually). The Department uses a survey report directly written by the students' supervisor at the co-op site to learn about important student competences. The questionnaire requires responses for each of the 1 through 7 student outcomes.
5. *CHE External Advisory Board, BOA, (Annually).* The CHE External Advisory Board consists of between 18 members selected primarily from employers of our students, related industries and accomplished alumni. BOA is an advisory group which provides input and feedback on various curricular and accreditation matters (ABET, SACS, THEC Graduate Program Review). Some BOA members also regularly serve as the External Evaluators for the Senior Design Projects. The BOA bi-annually meets with the students, in the absence of faculty, to gather input regarding student impressions across the 1 through 7 student outcomes, but not necessarily focusing on any particular outcome. The data is gathered during a one-hour meeting in an informal setting and is communicated likewise to the faculty during an oral briefing session. At times the BOA may report in writing regarding select items, but that decision is left to them.

Assessment processes used, the frequency of application and expected level of attainment.

	Assessment Process	Student Outcomes*	Assessment Frequency	Expected Level of Attainment
Processes for Student Outcomes Assessment				
1	Senior Survey	a-k	A population of seniors is surveyed once every third year.	/ L N H U W •
2	External Assessment of Senior Design Projects	a, c, d, e, g, h, k	Design II projects are externally assessed in the Spring of each year.	>60% (>70%)
	Course-Level Assessments	a-k	Course-Level Assessments are completed for select courses every term in which they are offered.	>60% (>70%)
	Co-Op Employer Assessments	a-k	Co-Op	
4	Co-Op Employer Assessments	a-k	erp (co)9 (e)-11.Tm (-)Tj ET Q q 237.1 (-)Tj E 220.04 TW4	

input from the BOA, generally positive feedback is considered the expected minimum outcome. As an example, generally positive remarks include those regarding the program from the student body in communication to the BOA (e.g., "we feel prepared in design" or "our lab experience helped me to relate to the theory" or "classes are difficult, but fair," etc.). Anything less than generally positive feedback would be discussed and considered by the faculty.

Results:

Results (for Critical Thinking)--Program Goal 2 and Student Learning Outcomes 1, 2, and 6: For 2020-2021, 56 students in CHE took the California Critical Thinking Skills Test (CCTST) with a mean score of 79.3. This score is similar to that from the converted scores from the previous two years (2018-2019: 81.0, n = 42 and 2019-2020: 79.0, n=48).

Source: <https://www.tntech.edu/iare/assessment/criticalthinking.php>

Results (from Board of Advisors' Meetings)--Program Goals 1-4: The BOA meetings are held annually. The BOA generally documents its findings in the form of an Executive Summary. Their findings regarding student success and satisfaction are reported there. Recommendations are used specifically as feedback into the program's curricular change process; however, such are rarely made by the BOA. Broader programmatic issues are typically identified by the BOA and are used to influence elements, including but not limited to faculty numbers and institutional support.

At the BOA meeting in November 2020, the following topics were discussed:

- x Options related to a potential pilot plant install
- x Department updates/needs
- x Upcoming ABET review

In addition, the BOA had conversations with the Dean of the College of Engineering. Interactions with faculty and staff in the department as well as undergraduate and graduate students were also a major aspect of the meeting.

Results (from Co-Op Performance Assessments)--Program Goal 1 and Student Learning Outcomes 1, 3-5, and 7: For the Summer 2020 through Spring 2021 semesters, nine CHE students completed a total of 13 co-op semesters. Each student is assessed by their on-site supervisor via a survey. This Co-Op survey includes 12 questions which per the new ABET Student Learning Outcomes map to Outcomes 1, 3-5, and 7. Survey questions are ranked on a 1 (lowest) to 5 (highest) scale. Our rubric is that no student receives a score lower than 3. On average, scores for this reporting period are between 4 and 5 for most students with an occasional lower score. -

SLO 1. FORMULATE & SOLVE – an ability to identify, formulate and solve complex engineering problems by applying principles of engineering, science and mathematics

Assessment Process

2018-19

SLO 3. COMMUNICATE – an ability to communicate effectively with a range of audiences.

Assessment Process (threshold Student Outcome attainment level)		2018-19	2019-20	2020-21
Senior Survey ~ H i i 9 } (C E • % o } v • •		o } Á - C E μ	22%	N/A
External Assessment of Capstone Labs (team À C E P G ó i 9 •		-	89%	94%
Course-Level Assessments	, i i i i d C E v • X ^] X	-	87%	
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	, ð î ð ì % o • š } v >	~ G - ó i 9 •	90%	80% (Median)
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SLO 5. *TEAMS* – an ability to function effectively on a team whose members together provide leadership,

SLO 7. KNOWLEDGE ACQUISITION – an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Assessment Process (threshold Student Outcome attainment level)	2018-19	2019-20	2020-21
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the beginning of the semester. It was also suggested that a lab component would be tremendously helpful to improve students' learning experience.

Towards a focus on benchmarking, the completion of a "major field test" by our graduating seniors is a new requirement. The topic has been discussed significantly at recent departmental meetings where we discussed and voted that Design II rubrics (from the CHE 4420 course) will be the basis for our major field

Appendix 1: Curriculum Map