DEPARTMENT OF THE ARMY
UNITED STATES MILITARY ACADEMY
West Point, New York 10996

MADN-CLS 3 June 2025

MEMORANDUM FOR RECORD

SUBJECT: Minutes of the Chemical Engineering Advisory Board Meeting (AY25-2)

1. The Chemical Advisory Board Member Meeting is critical to our mission at the Academy and our ABET accreditation process. We value the feedback and service of the Board Members that has continued to strengthen our ability to educate cadets as chemical engineers and future Army Officers, particularly in crafting and continually reviewing our Program Educational Objectives (PEOs).

2. Due to the DoD guidance for the reduction and consolidation of Government travel via DTS, we decided to conduct our activities remotely this year.

3. These activities included the following:

- Review of the AY24 Program Assessment Data
- Review of the Advisory Board Slides Deck
- Completion of AY25 Advisory Board Survey and return to Dr. Nagelli

4. Feedback on PEOs and review of performance data is contained in the archived surveys.

5. The point of contact for this document is the undersigned at enoch.nagelli@westpoint.edu or 845-938-3904.

Enoch Nagelli

ENOCH A. NAGELLI
Associate Professor
Director, Chemical Engineering

Summary and Minutes of the Chemical Engineering Advisory Board Meeting, 2025, Remote

The advisory board was asked to comment on various aspects of the curriculum, the meeting content, and any other issues that they would like to raise. The survey questions are underlined and in bold font below, followed by responses of individual members. A summary in red font appears at the end of each section.

Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

Armstrong: The program is proceeding along the right path. I believe that a numerical methods class would be advantageous to the Program.

Daniel: No, the courses that already exist in the curriculum are appropriate for the program educational goals.

Dietrich: I continue to believe that Chemical Engineers should be required to take both intro Organic Chemistry and Intro 2 organic chemistry.

Hair: In previous years, I have expressed that a single semester of organic chemistry is insufficient to do more than learn the language of it, not to understand the how and why of reactions. I still think that and would like to see a second semester added. I don't know how to evaluate some of the courses that look marginal on the bar charts without further discussion with the faculty, cadets, and board. So I'm unsure if any other classes should be added.

Hill: We are so limited in our ability to deliver courses given our 47-month experience and the number of humanity courses our cadets must take. I'd be able to form more of an opinion if we had the chance to talk with cadets. Thus, I'll say no at this point.

Krishnamoorthy: None. I continue to feel that you offer a well-rounded program given the time constraints on the cadets.

Liberatore: Curriculum is sound.

Schultz: Possibly having some bio courses that could be swapped out with the intro to electrical engineering or other out of topic classes might be nice. I know these were being developed, I just can't remember how the students can fit these courses into their schedules.

Shipe: This is hard to comment on with only looking through the data and being unable to ask questions and discuss.

Theising: No, it appears that coursework added in response to poor performance (vs. national averages) on certain FEE topics has resulted in general improvement. EE301 remains highly unpopular among cadets, and while I realize some of the content of that course is required for FEE preparation, I believe there has been discussion on establishing a version of that course that has more direct applicability to the ChemE curriculum (much easier said than done, I'm sure).5.

R&A: The program is well-rounded and has the right courses. Suggestions for additional courses are numerical methods, organic 2, or some sort of bio course.

Do you have any suggestions to improve the advisory board meeting for next year?

Armstrong: The only item I would like to add here is that there is not a way to replicate meeting in person. Would it be possible to lock in the funding for the visit in the Fall so the funding will not get taken away in the Spring? Meeting is critical for gauging the atmospherics of the program and interacting with the Cadets.

Daniel: It was a shame we could not meet, as the discussion among us is most valuable to thoroughly assessing the program, but I understand the circumstances. I look forward to getting back to regular meetings. Should that not occur, perhaps setting aside at least one afternoon to review the slides with us and provide some breakout room time for us to discuss, followed by Q&A with the faculty would be a better substitute.

Dietrich: It is critical that the board actually meet and meet the students to get direct feedback on the courses and in particular to get feedback on those that the students are not doing well in. If an actual meeting cannot be held, I believe that this negatively impacts the feedback of the board.

Hair: Meeting in person with the cadets, faculty, and board allows a better, more complete assessment of how well the program meets its goals. I think this is an important part of the process. The extensive and thorough bar charts provided for each program objective, which include class performance, student evaluations, faculty evaluations, and results on the professional engineering exam, make it possible to carry out a surprisingly rapid and thorough evaluation.

Hill: Not for you! Hopefully, travel restrictions will not keep us from meeting next year. Thank you for keeping us in the loop and for providing us with these materials.

Krishnamoorthy: None. Best wishes with your accreditation visit next year.

Liberatore: Be able to meet in person!

Schultz: Have a meeting.

Shipe: Being able to meet with and interview the cadets and faculty is essential for a full assessment of the program. It is hard to determine the cadets' knowledge of the program and objectives, properly assess their understanding, and gauge their opinions with just the data on paper. I hope we can meet in person, or at least virtually, in the future in order to help USMA ChemE remain one of the top programs in the nation and maintain ABET accreditation.

Theising: While I'm sure the idea of another survey would not be popular with the cadets, it may be beneficial to have the board members draft a few questions to present to them in case future in-person board meetings are postponed or cancelled. Another option might be to ask the cadets for volunteers to have a one on one call with a board member (even if that call occurs after graduation).

R&A: Advisory board members are concerned about the lack of an in-person meeting.

Please add any additional comments that you would like to make below.

Armstrong: The Program is progressing and gaining more and more chemical engineering students. I would like to see the addition of a biomolecular, or biomedical engineering option in the Department at some point. I would also like to see a numerical methods course that could even teach some Machine Learning basics.

Daniel: It looks like ethics dipped a bit and is the lowest (page 4 of the slide deck) as well as safety and health (page 7) dropping too (also summarized on page 8). It is kind of concerning for the officers of the military to not be high in these categories. Some of the other slippage in the technical areas might be due to the drop in math skills as well. This is something we have seen here at Cornell too, post-pandemic. Just something to be aware of and stay on top of. It appears as we get farther away from the pandemic, this is rebounding so I might expect you to see that too.

Dietrich: None, no comments.

Hair: I'd like to thank the faculty for their dedication to the education of these marvelous young chemical engineering cadets. Thank you.

Hill: None, no comments.

Krishnamoorthy: FE exam pass rates have dropped over the past 2 years (although still higher than national averages). Course grades in Organic Chemistry have also dropped over the past 2 years. Are these indicative of the level of academic preparation of the incoming cohort? Student response surveys for CH400 (Is this the FE prep course?) are lower than the expected level of attainment for several of the student outcomes while the course embedded student indicator results are above the expected level of attainment. Any insights into the reasons for the mismatch would be useful.

Liberatore: Is there any correlation between cadet GPA and not passing the FE? Staying above the average pass rate is a very good indicator of a healthy program. Cutting data presented to the last 5 or 6 years would make the figures and analysis more focused in future years. Table 4-2 should be reported to two sig figs or 0.1 since the stdev values are all much bigger than 0.1.

Schultz: Organic chemistry still seems to be place for improvement. The average GPA for the class is very low, there may need to be an intervention to break this cycle since it seems to have persisted for some time.

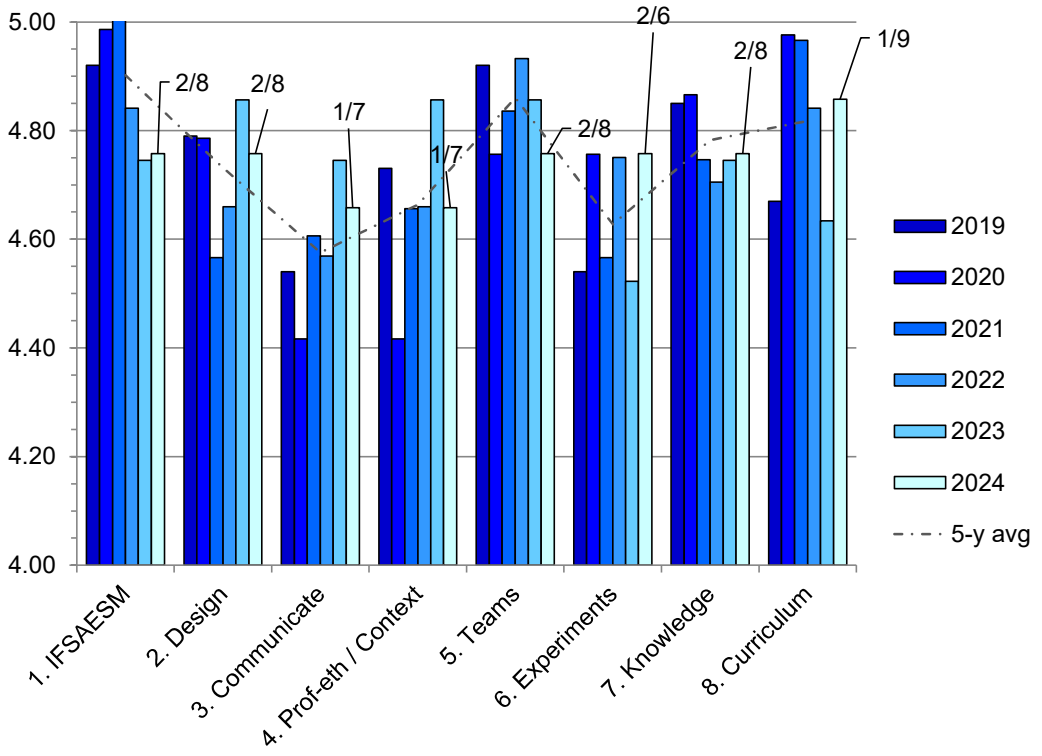
Shipe: Again, the lack of meeting with the cadets and faculty seriously degrades the ability to properly comment on the program and curriculum of the Chemical Engineering major at USMA. I hope next year we can meet, at least virtually, to talk to the cadets and faculty.

Theising: None, no comments.

R&A: Comments are diverse. Members again emphasized that they did not like the lack of an in-person meeting.

Advisory Board Student Outcomes (SO) Survey Results:

The chemical engineering advisory board is asked to rate performance of cadets on student outcomes (SOs) based on data presented to the board at the advisory board meetings. Advisory board responses for AY2019 to AY2024 are shown in the figure below, including data from the most recent advisory board meeting, conducted remotely May-June 2025. Data for AY2025 is not available until after the advisory board meeting in spring of 2026. Data labels are response frequencies for responses of 4 or 5 (# of 4s / # of 5s) on the 1-5 Likert scale used in the survey. For example, in outcome 1 IFSAESM, 8 out of 10 board members responded with a 5 and there were two 4's, so the label is 2/8. The five-year average is the dotted line. A single relative low is seen in outcome 7. The survey questions are below the figure.



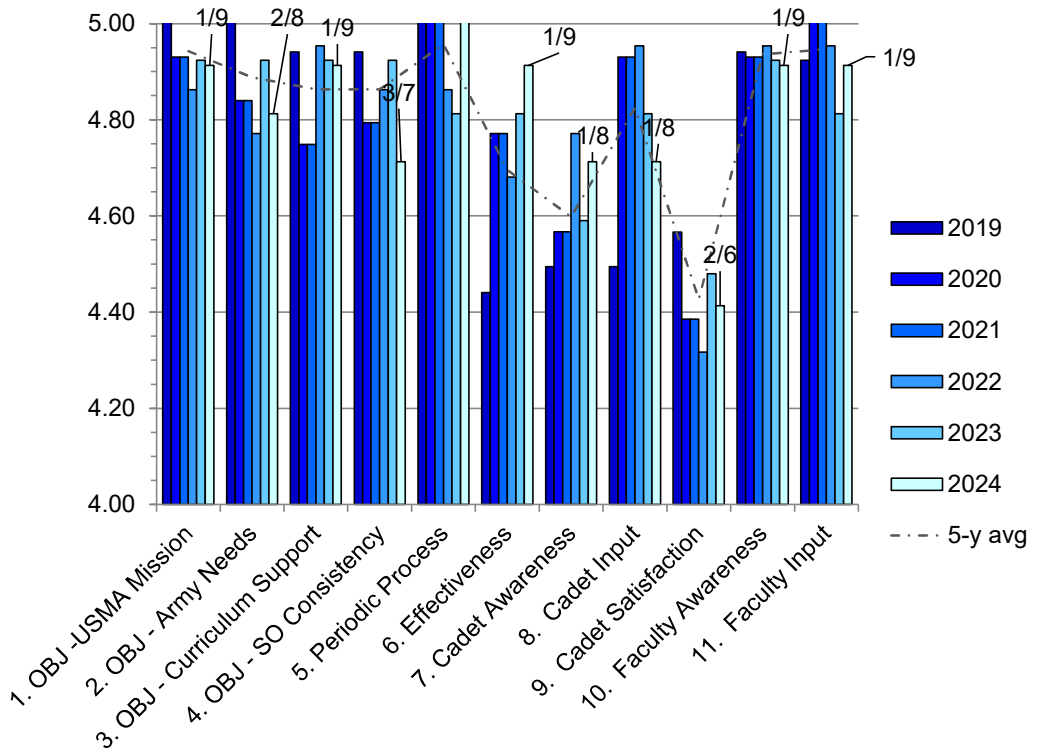
Survey Questions:

1. The cadets in the program are able to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. The cadets in the program are able 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.
3. The cadets in the program are able to communicate effectively with a range of audiences.
4. The cadets in the program are able 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.

5. The cadets in the program are able to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. The cadets in the program are able to develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.
7. The cadets in the program are able to acquire and apply new knowledge as needed, using appropriate learning strategies.
8. The cadets in the program have attained a thorough grounding in and working knowledge of the chemical engineering curriculum.

Advisory Board Program Educational Objectives (PEO) Survey Results:

The primary task of the advisory board is to assess the program educational objections (PEOs) of the chemical engineering program. A survey was administered to the board after a series of targeted activities involving the cadets and after a presentation of the PEOs by the program director. Advisory board responses to the program survey for AY2019 to AY2024 are shown in the figure below, including data from the most recent advisory board meeting, conducted remotely May-June 2025. As before, data for AY2025 (this year) are not available until after the advisory board meeting in spring of 2026. Data labels are response frequencies for responses of 4 or 5 (# of 4s / # of 5s) on the 1-5 Likert scale used in the survey. For example, in question 1, which pertains to the consistency of the PEOs with the USMA mission, 9 out of 10 board members responded with a 5 and there was one score of 4, so the label is 1/9. The five-year average is the dotted line. A single relative low is seen in question 8, dealing with cadet satisfaction with the courses in the program.



Survey Questions:

1. The program objectives are consistent with the USMA mission.
2. The program objectives are consistent with the needs of the Army.
3. The program curriculum supports the program objectives.
4. The student outcomes are consistent with the program mission and objectives.
5. The program has a process for periodically assessing the achievement of its student outcomes.
6. The survey methods used by the program are effective.
7. The cadets in the program are aware of the program objectives.
8. The cadets are given an opportunity to provide their opinion about the program objectives.
9. The cadets are satisfied with the courses in the program.
10. The faculty are aware of the program objectives.
11. The faculty are given an opportunity to provide their opinion about the program objectives.