



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

MADN-CLS

19 December 2024

MEMORANDUM FOR RECORD

SUBJECT: Chemical Engineering Program Assessment and AAR (AY25-1)

1. The senior faculty of the chemical engineering program at the United States Military Academy met on 19 December 2024 to conduct a post-semester review of courses taught during Fall 2024 and current program assessment. The faculty members in attendance were Dr. Andrew Biaglow, LTC Sam Cowart, Dr. Enoch Nagelli, and Dr. Simuck Yuk. Chemical engineering faculty members not in attendance were COL Corey James, MAJ Louis Tobergte, CPT Sam Lowell, CPT Liz Golonski, and CPT Nijel Rogers.

2. Each course director presented topics and relevant assessment to their specific courses. These topics are outlined in more detail in the individual course assessments. These post-semester discussions serve as a tool to gauge effectiveness of course content and administration in meeting the ABET student outcomes specific to each course. Comments and questions from these discussions support the more formal content of the written course assessment packages that are completed at the end of each academic term. Ideas for course improvement and potential future changes are the focus of the discussions.

3. CH350 Bioprocess Engineering, CH363 Separations Processes, CH365 Chemical Engineering Thermodynamics, CH459 Chemical Engineering Laboratory, and CH485 Heat and Mass Transfer were reviewed and thoroughly discussed by all attendees. Some of the topics led to broader discussions relevant to the entire program. These included: 1) feasibility of requiring a second semester of organic chemistry as a basis for the bioengineering electives, 2) continuing to address course assessment from last time the course was taught, 3) routine maintenance of the various experiment-related equipment used in course laboratory exercises, and 4) faculty allocations in support of CH459.

4. The point of contact for this document is the undersigned at samuel.cowart@westpoint.edu or 845-938-8555.

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UNITED STATES MILITARY ACADEMY
WEST POINT.

Chemical Engineering

Course and Program AAR, AY25-1

Dr. Enoch Nagelli & LTC Sam Cowart



Agenda

- ☐ **CH350**
- ☐ **CH363**
- ☐ **CH365**
- ☐ **CH459**
- ☐ **CH485**
- ☐ **Chemical Engineering Program AAR Comments**



- ❑ **Course average: 91.2%; TEE average: PENDING**

Sustain:

- ✓ **Detailed derivation of governing equation for bioreactors across various scenarios helped cadets understand how changes in mass balance occur.**
- ✓ **Focusing on kinetics from a biological perspective helped cadets understand the key differences between chemical engineering and biological approaches.**

Improve:

- ✓ **Continuous improvement of problems in the Problem Set, WPRs, and TEE is necessary to better align with the learning objectives.**
- ✓ **A stronger introduction to organic chemistry concepts in Block 1 is needed, as they are essential for understanding key bioengineering concepts later introduced in the textbook.**



- ☐ **Sustain: Capstone, NTU calculations**
- ☐ **Improve: Problems sets were the focus for this AY, improving/reviewing labs need to be the focus for next AY**
- ☐ **Do we want to re-energize the Bayway trip (or similar)? Do we have the connections still?**



- ☐ **Response to AY24 course assessment:**
 - ☐ **Efficiencies found – rubric method – fillable forms for feedback; capstone IPR pass-fail. Used Wacom tablet to help with speed grading.**
 - ☐ **Excess Gibbs energy added to capstone.**
 - ☐ **Adjustments to course objectives completed.**
- ☐ **CDP: changed CDP to individual and used Perry's data instead of ebulliometer.**
- ☐ **Writing skills – several exercises on plotting.**
- ☐ **Writing assignment (sustain) – resumes, iterative. Cadets are uncomfortable saying what they have learned in their courses.**
- ☐ **Performance on exams was strong. Averages: WPRs $89.2\% \pm 11\%$ compared to $85.5\% \pm 10\%$ in AY23. TEE: $82.2 \pm 15\%$ versus $83.92 \pm 8\%$ in AY23.**
- ☐ **Course assessment incomplete as of 12-16-24. Blackboard surveys 100%. Tracking performance in FEE for thermo topic.**
- ☐ **Sustain change from last two years – rubric grading with resubmission. Forces cadets to examine homework to find mistakes. Cadets must make corrections to initial submission and describe what they did wrong.**
- ☐ **Videos added to lesson modules.**
- ☐ **Machine-learning exercises added to homework, capstone, and enrichment.**



- ❑ **WPR1 tests round robin 1 material & WPR2 tests round robin 2 material.**
 - ❑ **WPR1 Average = 78% (AY24-1: 86.2%)**
 - ❑ **WPR2 Average = 82% (AY24-1: 84.3%)**
- ❑ **SWE Executed as EXSUM on DIST for second AY in a row**
- ❑ **Same cadet groups for both round robins**
- ❑ **More emphasis on depth in controls: identify/choose one automatic control variable to conduct Laplace**

Improve

- ❑ **Emphasize first resort for cadets on sample calculations with full units and governing equations** either in MMA or digital/handwritten notes before reverting to Excel.
- ❑ **Despite emphasis on roles within groups, cadets minimized free energy and chose to not work on all aspects of lab deliverables. Impacts performance on WPRs & TEE.**

Sustain

- ❑ **2 Instructors/section!** Helps with coverage of topics and interaction with groups.
- ❑ **Technical Communication in Unit Op Controls: Emphasis on P&IDs** on Lucid Chart with automatic control loops and transfer of units by connecting to Laplace block
- ❑ **Continue daily IPRs** with groups and final graded IPR before submission – helps with final deliverable.



Previous changes maintained

Changes made 25-1

Recommended changes 26-1

- ❑ **Course average: 87.96% (after TEE), AY23-1: 85.25%**
- ❑ **Maintained high number of example problems for each lesson**
 - **FEE practice problems**
 - **Problems from other transport texts useful as new PS problems**
- ❑ **Maintained problem solving days before WPRs/ICPS**
- ❑ **Maintained formal discussion of radiation heat transfer**
 - **Included new ICPS, PS, and Lab problems that involved radiation**
- ❑ **Increased number of problem sets to 10 (50 points each)**
 - **PS1 new; focused on fundamental transport relationships and solving basic differential equations; set the stage for the course**
 - **Shortened middle-of-semester PS; due more often and relevant to in-class material**
- ❑ **Changed Lab 7 to Convective & Radiative Heat Transfer**
 - **Gave cadets previously collected data due to equipment maintenance issues**
- ❑ **Conduct thorough maintenance on lab apparatus**
 - ❑ **Delivered experimental data to cadets for Labs 4, 5, 6, and 7 due to equipment issues**
 - ❑ **Develop / re-start backup labs (membrane air separator, LL Extractor, WW column)**



End of Semester Close Out for CDs: End of Semester Archive/Course Assessments

- ❑ **End of Semester Archive** DUE within **1 Week after posting final grades** (IAW CD Hbook) for Course/Graded Events Folder content.
 - ❑ Department Sharepoint: All course materials in Course Folder; Graded events into GE folder
- ❑ **Course Assessment** DUE within **30 days of final grades posting!** (IAW CD Hbook)
- ❑ Assistance on outcomes assessment worksheets (1/0)
- ❑ Submit to Dr. Biaglow for review.

- ❑ Please include only 6 years of data in your assessment packets.

Example:

5. Course QPA (previous 6 years)

AY20-1	AY21-1	AY22-1	AY23-1	AY24-1	AY25-1
3.52	3.62	3.72	3.54	3.73	3.62

6. TEE History (previous 6 years)

AY20-1	AY21-1	AY22-1	AY23-1	AY24-1	AY25-1
86.1%	N/A	86.1%	75.0%	83.9%	82.8%



ABET Accreditation

- ❑ Record Year AY26
- ❑ Self-Study Submitted **01JULY2026**
- ❑ Program Evaluator Feedback from **Visits Fall 2026 (AY27-1)**
 - ❑ Appropriate engineering standards
 - ❑ Constituents of PEOs
 - ❑ Document waivers (irregularities for graduation)
 - ❑ Criterion 4: need to use direct indicators and align indicators with outcomes
 - ❑ Address all "words" or "aspects" of all student outcomes
 - ❑ Focus Areas: Bioengineering Electives for Majors, FEE Performance, and Program/Course Assessments

Classroom Observations continue in AY25-2!

Advisory Board on 11APR25

- ❑ Dinner with Board members on 10APR25
- ❑ Meeting is on 1-Day on 11APR (Coordinate for support from ChemEs in CH101)
- ❑ Dr. Nagelli coordinating with board members & IPR with COL Burpo/COL James
- ❑ MAJ Tobergte (Primary) & CPT Golonski & CPT Rogers (Assistants)

Bioengineering Update

- ❑ **Minor is live and approved!**
- ❑ CH300, CH350, and CH450 seats for minor managed at program level.

AIChE Club (OIC: CPT(P) Lowell and CIC: CDT Eddie Chen)

- ❑ Trip Section events for AY25-2 for cadets in Club:
 - ❑ **Bayway Refinery** (POC: CPT(P) Lowell)
- ❑ Chocolate Club and Study Halls are going strong!