



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

MADN-CBE

22 May 2025

MEMORANDUM FOR RECORD

SUBJECT: Chemical Engineering Program Assessment and AAR (AY25-2)

1. The senior faculty of the chemical engineering program at the United States Military Academy met on 21 May 2025 to conduct a post-semester review of courses taught during Spring of 2025 and a program assessment. The faculty members in attendance were Prof. Andrew Biaglow, COL Corey James, LTC Sam Cowart, Dr. Enoch Nagelli, Dr. Simuck Yuk, MAJ Samuel Lowell, MAJ Louis Tobergte, and CPT(P) Nijel Rogers. Chemical engineering faculty members were not in attendance were MAJ Josh Frey and CPT(P) Elizabeth Golonski.
2. Each course director presented topics and relevant assessments 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. The following courses were discussed: CH362 Mass and Energy Balances, CH364 Chemical Reaction Engineering, CH367 Intro/Automatic Process Controls, CH400 Chemical Engineering Professional Practice, CH402 Process Design, CH300 Biomedical Engineering, and CH450 Biomedical Engineering Modeling & Analysis were reviewed and thoroughly discussed by all attendees. Some of the topics led to broader discussions relevant to the entire program. These included: 1) the software used in the prerequisite math courses to better align usage in major courses, 2) continuing to map our AAR course slides to our Course Assessment, 3) development of P&ID training and acumen for chemical engineering processes, 4) continuing to address course assessment from last time the course was taught, and 5) in particular, continuing to emphasize the relevance of integrating more process simulator exercises with SSI together with P&ID acumen to help develop chemical engineering process design efficiency.
4. The point of contact for this document is the undersigned at enoch.nagelli@westpoint.edu or 845-938-3904.

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UNITED STATES MILITARY ACADEMY
WEST POINT

Chemical Engineering

Course and Program AAR (AY25-2)

Dr. Enoch Nagelli and LTC Sam Cowart

21 May 2025



- ☐ **CH362**
- ☐ **CH364**
- ☐ **CH367**
- ☐ **CH400**
- ☐ **CH402**
- ☐ **CH300**
- ☐ **Chemical Engineering Program AAR
Comments**



- ❑ **Course average: 83%; TEE average 70% (no curve – last year's was 75% pre-curve)**
- ❑ **Maintain graded event structure**
 - ❑ **3x WPR / 4x ICPS / TEE / 7 labs / 8 PS**
 - ❑ **Group Capstone Presentation & Research Paper**
- ❑ **Keep 5 CHEMCAD labs, Hands-on lab and optimization lab**
- ❑ **Keep Pre-Reqs quiz on lesson 2**
- ❑ **Keep optional (bonus point) Mass Balance Mastery Assignment**
- ❑ **Keep optimization block at the end of the semester**
- ❑ **Cadets brief example problem solution the next class (1 per cadet, 5 min brief, 10 points)**
- ❑ **Write optional (bonus point) Mass & Energy Balance Mastery Assignment**
- ❑ **More dimensional analysis and general chemistry throughout**
 - ❑ **Specifically focus on limitations of Ideal Gas Law**
- ❑ **Test teaching the course in Python (initial attempt was promising)**
- ❑ **Create Mass & Energy Balance-themed Trip Section (oil refinery)**
- ❑ **Analyze using lab periods for WPRs 1 & 2 and making 2 labs fit into 55-minute lesson**
 - ❑ **Will facilitate more thorough testing of their knowledge (and more time to troubleshoot code)**



- ❑ **Course average: 86.7%; TEE average 81.9%**
- ❑ **Sustain CH364/CH367 super capstone project; tied in multiple concepts into a coherent project. Sets up cadets for Firstie year.**
- ❑ **Maintain capstone focus on detailed technical design report, with focus on developing feasible, profitable reactor system (w/ control scheme).**
- ❑ **Dedicated capstone working periods; graded azimuth check, IPR.**
- ❑ **Maintain problem set frequency & time commitment.**
- ❑ **Tie in lab work with problem set questions; see if cadets will make connection on usefulness of CHEMCAD for analysis of theoretical work.**
- ❑ **Introduce cost estimation in CHEMCAD for reactor sizing with each lab.**
- ❑ **Add 1 or 2 FEE-type questions to WPRs (basic conceptual questions); average on Problem A, TEE was 72.2%.**
- ❑ **Develop bench of additional PS problems, with increased reliance on numerical solvers and multiple concepts.**
- ❑ **Numerical solver skill still lacking; seems to be declining over past several years; MMA not utilized much in MA364.**



Sustain:

- ✓ **Capstone with CH364 was a success.**
- ✓ **Reduced the emphasis on advanced topics like MPC, state space, etc. and worked to get Cadets more comfortable with fundamentals.**
- ✓ **Lesson 1: Introduce a series of examples to clearly articulate the “so what”. This was done in the sub-basement and had a great effect. Model the level in the absorption column on the spot.**
- ✓ **Continue use of SSI for describing/demonstrating dynamic behavior, stability, controller design, and tuning. The Cadets get a lot out of SSI and it allows you to start relatively simple and scale up.**

Improve:

- ✓ **Work more problems in class.**
- ✓ **To facilitate a deeper understanding and engineering intuition, relate controllers and modeling to electrical circuits learned in EE301.**
- ✓ **Introduce python and ChemCAD to model controllers and control loops.**
- ✓ **Improve the controls portion of the Capstone. Add the requirement to provide a P&ID, improve format of block diagrams and P&IDs, and in general provide more guidance.**



Sustain:

- ❑ **19/30 Cadets Passed the FEE Overall. 63.3% Pass Rate (1st time = 60.0%)**
 - ❑ **1/6 Cadets Passed on 2nd Attempt**
 - ❑ **11 Failures Total**
 - ❑ **1x Attempt Failures: Field, Nash, Wallace, Lareau, Dolin, Verkleeren**
 - ❑ **2x Attempt Failures: Guevara-Cragwell, Derivaux, O'Hara, Rameriz, Porcaro**
- ❑ **Had 2 lessons per topic (1st lesson is practice problems & FE Ref Manual, 2nd lesson is Quiz)**
- ❑ **Used Canvas Quizzes as timed assignments on topics**
- ❑ **Continue SSI modules: DIST & ACU**

Improve:

- ❑ **More timed Canvas Quizzes on FE Topics**
 - ❑ **Cadets come to class take a timed Canvas Quiz with immediate results**
 - ❑ **Instructor will have immediate survey of student performance**
 - ❑ **Go over specific problems**
- ❑ **Add additional SSI-Simulator Exercises**
 - ❑ **ACU Exercise with scenarios**
 - ❑ **CTOW with Level Controller**
- ❑ **Add P&ID Controls Problems**



Sustain:

Capstone project - Use AIChE design problem; recent problems are good fit with curriculum. If possible, use multiple problems for cadet "choice." (Sustained from AY24.)

Time survey quizzes, design groups based on grades, field trip was a good idea.

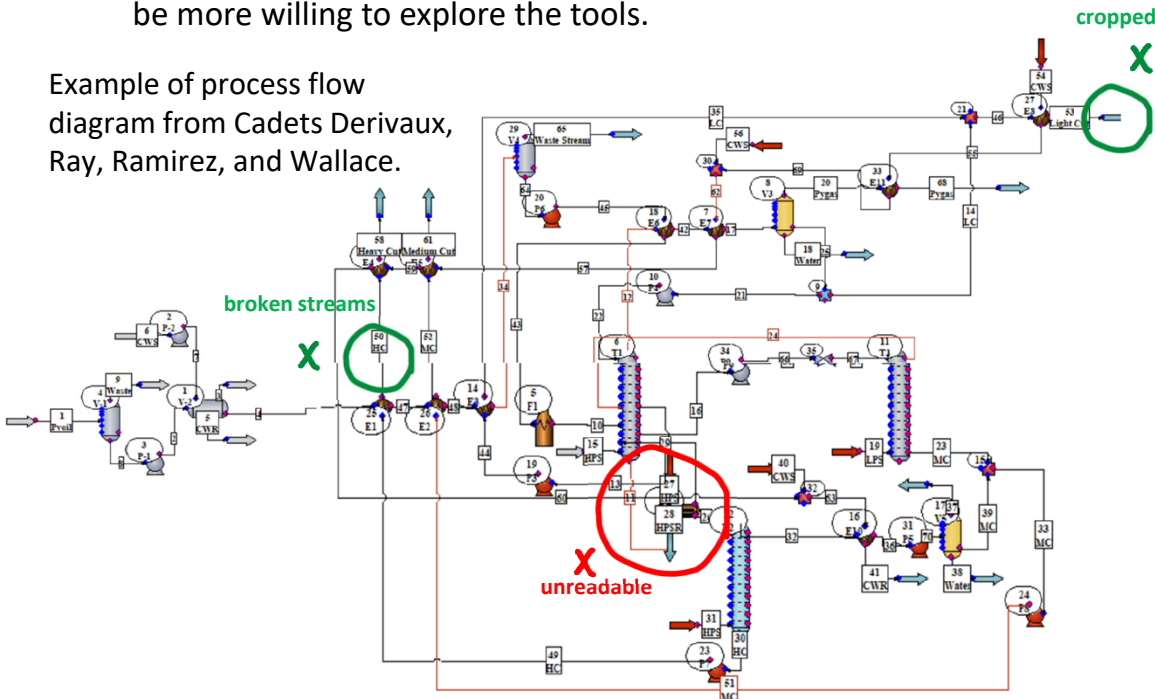
Use of sample documents and templates.

Improve:

Control – Knowledge of control schemes and ability to draw P&IDs was lower. Some control loops did not make sense (70.43% course average in 1/0 compared to 90% last AY)

CHEMCAD – Cadets did not use the environmental tools in CHEMCAD. Not covered, but at this point, I want cadets to be more willing to explore the tools.

Example of process flow diagram from Cadets Derivaux, Ray, Ramirez, and Wallace.



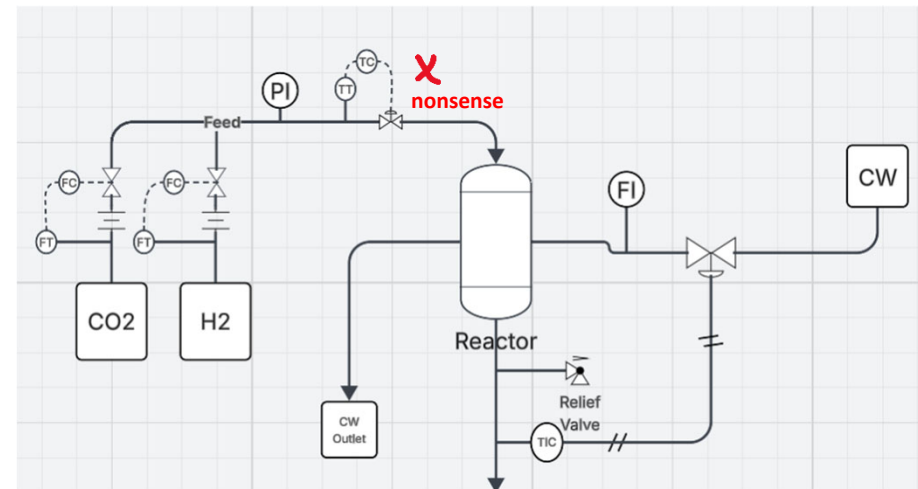
Research:

Discussion of boiling point analysis for groups 5-8 was not strong. Cadets did not understand the significance of this result.

The two AIChE design groups were strong. Worked independently with limited AI.

Research on water content to define design specs was not good. Some groups did not incorporate this into design even though it was required.

Research on context and social issues was good for groups 5-8, but not as good for groups 1-4.





- ❑ **Course average: 90.1%; TEE average 87.2%**

Sustain:

- ✓ **Capstone projects were consistently highlighted as the most favored graded activity. Students showed strong engagement and enthusiasm, particularly regarding biomedical applications.**
- ✓ **Continue incorporating in-class activities to illustrate the formulation of governing equations and the process of obtaining quantitative results.**
- ✓ **Maintain the use of end-of-block quizzes to effectively assess cadets' comprehension of key learning objectives.**

Improve:

- ✓ **Expand the pool of problem-solving exercises, placing greater emphasis on numerical solvers and integration of multiple concepts.**
- ✓ **Continue to tune the in-class coding exercises with the contemporary subject matters.**
- ✓ **Revise the application problems in the Term-End Exam (TEE) to better assess cadets' ability to apply foundational biomedical engineering knowledge in practical contexts.**



1. **ABET Self Study/Documents will be priority in Summer**
 - ☐ CH459 Peer evaluations (Dr. Nagelli)
 - ☐ All Course Assessments Scrub (Dr. Nagelli & LTC Cowart)
 - ☐ Bioengineering Course Assessments (Dr. Yuk)
 - ☐ 1's and 0's Workshop for CDs (Prof. Biaglow, TBD on Date)
 - ☐ AY26 CD's BPT work on e-Coursebooks
 - ☐ (ALL) update CV's – will provide template
 - ☐ Teams page for KM
2. **Course Directors Handbook for all administrative guidance and SOP**
 - ☐ EXSUM on Dept Sharepoint to include Course AAR Slides
 - ☐ Course Folder on Sharepoint (Rosters – alpha & OML, Course Assessment, all Course Materials (SIS, lesson schedule/objectives, grades etc)
 - ☐ Graded Events Folder on Sharepoint (all graded events, solutions, and cut scales (labs, quizzes, WPRs, TEE, capstone, etc.)
 - ☐ **Course Assessment Due 30 days** after semester completion
3. **CH459 Summer FDW (Dr. Nagelli & Dr. Yuk)**
 - ☐ EVAP: Steam generator contract (June 2025 or Spring 2026)
 - ☐ Use Current Steam Generator and make sure operational
 - ☐ New reactor reservoirs are functional for RXTR experiment
4. **Bioengineering**
 - ☐ LTC Hummel is CD for CH350 in AY25-1 (FDW in June 2025)
5. **Conferences**
 - ☐ **AICHE Fall 2025** in Boston, MA – Undergrad poster competition for cadets to compete (1 poster per cadet; S: SEP 2024) (POC: MAJ Tobergte as OIC)
 - ☐ Faculty Oral Talk Abstracts Submitted: MAJ Tobergte & Dr. Nagelli



6. ChemE Collaborative Manuscripts

- ❑ Prof. Biaglow & COL James (Electrifying DIST)
- ❑ Dr. Yuk, COL James, LTC Cowart, & Dr. Nagelli (PVA/CNT Binder for LiS Batteries)
- ❑ MAJ Tobergte and LTC Hummel (Target Specific Discovery for Biosensors); MAJ Tobergte, Dr. Nagelli, Dr. Yuk, LTC Cowart, and Dr. Biaglow (AI-ML using Python for ChemE Process)
- ❑ MAJ Lowell, Dr. Nagelli, & COL Burpo (Cu/Pd DNA/CNT Aerogels)
- ❑ Dr. Yuk, Dr. Nagelli, LTC Cowart, COL Burpo (Galvanic Displacement of Noble Metal NPs onto Graphene/CNT)

7. Program “events”

- ❑ Department tailgate (OIC: CPT Rogers, AOICs: CPTs Glinski, Stewart)
- ❑ Winter formal (OIC: CPT Golonski, AOICs: MAJ Tobergte, CPT Glinski, CPT Stewart)