



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

MADN-CLS

16 December 2022

**MEMORANDUM FOR RECORD**

**SUBJECT:** Chemical Engineering Program Assessment and AAR (AY23-1)

1. The senior faculty of the chemical engineering program at the United States Military Academy met on 15 December 2022 to conduct a post-semester review of courses taught during Fall 2022 and current program assessment. The faculty members in attendance were Dr. Andrew Biaglow, LTC Sam Cowart, Dr. Enoch Nagelli, Dr. Simuk Yuk, Dr. Russell Lachance, and LTC John Belanger. Chemical engineering faculty members not in attendance were COL Corey James, MAJ Jeff Chin, MAJ Caspar Yi, MAJ Patrick Bowers, MAJ Galen Mandes, and CPT Sam Lowell.

2. 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. Each fall term (AY23-1) course was reviewed and thoroughly discussed by all attendees. Key points of discussion focused on the desired scope of major graded events (term-end exams, capstone projects, research papers), cadet proficiency with computational/simulation software, curriculum focus for CH363 (Separations), and a review of CH350 (Bioprocess Engineering) for the appropriate level of engineering topics credits.

4. The point of contact for this document is the undersigned at [samuel.cowart@westpoint.edu](mailto:samuel.cowart@westpoint.edu) or 845-938-8555.

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UNITED STATES MILITARY ACADEMY  
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**Chemical Engineering**  
**Course and Program AAR, AY23-1**  
**Dr. Enoch Nagelli & LTC Sam Cowart**

**15 December 2022**



# Agenda

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



- ❑ **WPR: Cadets performed similarly on the WPR #1 and #2.**
  - Some of them had a hard time employing MM kinetics correctly on different conditions and how to couple the Monod equation in the material balance of batch/chemostat.
- ❑ **Cadets relied heavily on the lesson slides to understanding the learning objectives rather than the textbook.**
- ❑ **Several revisions need to be made for AY24-1 to expand the ET contents in CH350:**
  - **Capstone Project:** capstone project needs to be in the format of “project” rather than simple literature review and brief. Need to find a bioprocess system where cadets can analyze the data and build a simple kinetic modelling.
  - **WPRs:** 2<sup>nd</sup> revisions have been made to incorporate more ET contents into the problems.
  - **TEE:** 1<sup>st</sup> draft has been created to assess the overall understanding of Cadets on CH350.
  - **PS:** 1<sup>st</sup> PS needs to be removed and merged into 2<sup>nd</sup> PS. New 5<sup>th</sup> PS will be reflecting more engineering design problems on the processing equipment.



## ☐ **Sustains:**

- ☐ **Sustain basic content (Chapter 1,4,5,6,7,8,9)**
- ☐ **CH363 provided a decent treatment of CHEMCAD and design**
- ☐ **Design project is a great first attempt at design but needs some editing to match their skills**

## ☐ **Improves:**

- ☐ **Students lack thermo and mass transport acumen when they encounter the topics in the book; leads to a watered-down version of what the book is presenting – is it time to reconsider swapping CH485 and CH363?**
- ☐ **Need more emphasis on tray efficiency**
- ☐ **NTU was a nice addition but had its challenges**
- ☐ **4<sup>th</sup> edition of text is missing material on leaching operations – should we cover it anyways?**
- ☐ **How are the CHEMEs performing on the separations sections of the FEE? Murphee plate efficiency?, packed column design?, Rayleigh Distillation?**
- ☐ **Do we really need the paper in CH363? Can we re-imagine the paper – maybe substitute a short summary of other sections in the text?**



- ❑ **CDP: Individual problems (2 molecules with conditions, used Aspen+ and CHEMCAD) – intense grading but worth it. Positive collaborative experience. Enhanced CHEMCAD acumen. Used collaborative spreadsheet on course web page and cadets posted their results – seemed to encourage timely work.**
- ❑ **Writing assignment – table for CDP. Iterative. Big improvement this year. Having interactive spreadsheet helped.**
- ❑ **Three CDP IPRs keeps cadets on task, but cadets were generally weak at identifying tasks for completion.**
- ❑ **Writing assignment – resumes, iterative. Provided format, so initial resumes were better again better this year. Most could not identify skills learned in the program, so this continues to be valuable.**
- ❑ **Performance on exams was strong. Averages on WPRs  $85.5\% \pm 10\%$  compared to  $88.0\% \pm 9\%$  in AY22).**
- ❑ **Course assessment incomplete as of 12-8-22. Blackboard surveys 62%. Tracking performance in FEE.**
- ❑ **Course is not complete. TEE and CDP still not graded as of 12-8-22.**
- ❑ **Change from last year – rubric grading with resubmission. I think cadets looked more at homework to find mistakes.**



- ❑ Continued to assign roles and had cadets rotate roles within each round robin:
  - ❑ Project Engineer, Process Engineers, Process Simulation Engineers (detail on next slide)
- ❑ Conducted Daily IPRs at End of Each Lesson – sit down with Project Engineer and feedback provided based on rubric
- ❑ WPR1 tests round robin 1 material & WPR2 tests round robin 2 material.
  - ❑ WPR1 Average = 82.2%
  - ❑ WPR2 Average = 84.3%
- ❑ Emphasis in the Labs
  - ❑ P&IDs on Lucid Chart/Visio with Control Loops
  - ❑ Developing and Labeling flow charts with process variables and units
  - ❑ Note: Cadets automatically revert to Excel for calculations.
- ❑ Overall weakness in CHEMCAD for this group.
  - ❑ Taking data and modeling into unit operation flow sheet



# CH459 AAR – Group Member Roles

No.	Roster Name (CD)	Lab Groups	Name
CD1	BOMKE, TESSA P	Group CD1 R,P,E	HWANG, DANIEL
CD2	HWANG, DANIEL		BOMKE, TESSA
CD3	KIM, AUGUSTINE H		AUGUSTINE KIM
CD4	KOMOROWSKI, TYLER J	Group CD2 P,E,R	KOMOROWSKI, TYLER J
CD5	LUCERO, JUAN D		TAPTICH, JOSEPH D
CD6	TAPTICH, JOSEPH D		LUCERO, JUAN D
CD7	TUTTLE, BROOKE E	Group CD3 E,R,P	TUTTLE, BROOKE E
CD8	ZLOTNICK, ARIELLE S		ZLOTNICK, ARIELLE S

E = Executive Summary

R = Lab Report

P = Poster

**LAB GROUP ROLES** (the numbers assigned below are based sequential order of cadet names in each group – top to bottom)

## 3 Person Group Order/Roles

\*Lab Group Team Leader (Project Engineer): 1 – 2 – 3

Plant Process Engineer (Operator): 3 – 1 – 2

Process Simulation Engineer (Analysis): 2 – 3 – 1

## 2 Person Group Order/Roles

\*Lab Group Team Leader (Project Engineer): 1 - 2 – 1

Plant Process Engineer (Operator): 2 – 1 – 2

No.	Roster Name (CD)	Lab Groups	Name
CD1	BEDOR, SAMUEL M	Group CD1 R,P,E	Jack Monroe Harrison
CD2	DAWSON, PATRICK B		Ruby Romsland
CD4	HARRISON, JACK M	Group CD2 P,E,R	Alex Liesen
CD5	LIESEN, ALEXANDER J		Molly Sawyer
CD7	ROMSLAND, RUBY L	Group CD3 E,R,P	Samuel Bedor
CD8	SAWYER, MOLLY L		Brian Dawson

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## LAB GROUP ROLES

## 2 Person Group Order/Roles

\*Lab Group Team Leader (Project Engineer): 1 - 2 – 1

Plant Process Engineer (Operator): 2 – 1 – 2





- ❑ **Course average: 83.6% (prior to TEE), AY22-1: 86.7%**
- ❑ **Incorporated more example problems for each lesson (about 60% now)**
  - ❑ **FEE practice problems**
  - ❑ **Problems from other transport texts useful as new PS problems**
- ❑ **Maintain problem solving days before WPRs/ICPS**
- ❑ **Included radiation heat transfer formally this year**
- ❑ **Alter writing assignment to align with program writing plan**
  - **Historically, 5 paragraph argumentative essay**
  - **Focused on contemporary issues**
- ❑ **Made change to in-person labs for Lab 6**
  - **Arnold Cell with acetone diffusion at 50°C**
  - **Cadet understanding of the situation/problem was increased**
  - **“Better” than sitting in class and watching video of acetone diffusion**
  - **Ordered additional Arnold Cell to double throughput**
- ❑ **Change Lab 7 for AY24-1**
  - **Wetted-wall column**



## CH459 Transition Plan

- ❑ Spring Training Schedule – Run Instruments with LTC Belanger to get one set of Data.
- ❑ Prep for Summer FDW in June 2023 (experiments, data analysis, SWE)
- ❑ New Evaporator Expected in 2023: Install POC – Dr. Nagelli and Mr. Mathew

## Guest Lecture Opportunities

- ❑ Incorporate ChemE faculty for ‘guest lectures’ in ChemE Major Courses
- ❑ Each Current CD coordinates with faculty who are interested

## Bioengineering Update

- ❑ Curriculum Memos Reviewed by COL Burpo and Preparing to Staff for Approval by Academy Department Heads
- ❑ Course/Track Development is opportunities for AIChE Education Publications
- ❑ Cadets who are interested in track courses – can add to 8TAP once Curriculum Committee approves after staffing (Early AY23-2)

## AIChE Club

- ❑ Trip Section events for AY23-2 for cadets in Club: Brewery Trip/Tour? Bayway Refinery?

## Faculty Classroom Observation Continues in AY23-2



## New Majors from Class of 2026

- ☐ Everyone will get advisees; roster will be developed after declaration
- ☐ DAC notes will be updated and re-distributed
- ☐ Firstie DACs: do detailed grad/transcript reviews this week

## ABET Advisory Board Meeting

- ☐ 13, 14 April 2023
- ☐ MAJ Yi (primary POC), CPT Lowell (assistant)

## Course Assessments / File Dump

- ☐ Assessment package due NLT 16 Jan 23
- ☐ Assistance on outcomes assessment worksheets (1/0)?
- ☐ Submit to Dr. Biaglow upon completion
- ☐ All course materials into SharePoint; Graded events into GE folder

**Student Outcomes Surveys complete (CH363, 365)? CH459 PEERS.**

**AY23-2 Highlights – Chin/Bowers CH101 CDs, Yi CH102 CD**