

Department of Chemistry and Life Science  
United States Military Academy  
West Point, New York 10996

MADN-CLS

25 May 2022

MEMORANDUM FOR RECORD

SUBJECT: Chemical Engineering Program Course and Program AARs AY22-2

1. The course assessment meeting for all AY22-2 chemical engineering courses was conducted on 25 May 2022. Attendees: COL Corey James, LTC Sam Cowart, Dr. Simuck yuk, Dr. Enoch Nagelli, MAJ Caspar Yi, MAJ Galen Mendes, and MAJ Patrick Bowers. The courses discussed were CH362 Mass and Energy Balances, CH364 Chemical Reaction Engineering, CH367 Introduction/ Automatic Process Controls, CH400 Chemical Engineering Professional Practice, and CH402 Chemical Engineering Process Design.
2. Each course director presented topics relevant to their specific courses. These topics are outlined in more detail in the individual course assessments. The course director slides coming into the meeting are provided as enclosures.
3. Some of the topics led to broader discussions relevant to the entire program. These included: 1) general communication skills and technical writing abilities, 2) the use of technical communication assignments in each course to unify program effort, 3) problem sets within courses should be reviewed and changed routinely, 4) and continued efforts to send major graded events course supervisors for review and feedback. In particular, the consensus was that the program needs to develop a unified way to improve and assess communication ability within its major, beginning from the very first courses, 5) integrate chemical engineering process modeling problems within courses, and 6) emphasize the relevance of the help function in Mathematica and other software tools.
4. POC is the undersigned.

Encl

Course and Program AAR Slides

DR. ENOCH A. NAGELLI

Associate Professor

Chemical Engineering Program Director



UNITED STATES MILITARY ACADEMY  
**WEST POINT.**

**Chemical Engineering**  
**Course and Program AAR**  
**Dr. Enoch Nagelli and LTC Sam Cowart**

**25 MAY 2022**



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



Course assessment complete

- ❑ **Course average: 88.5%; TEE average 86.5%**
- ❑ **Maintain working example problems for each lesson (at/near 100%, with multiple problems per lesson)**
- ❑ **Maintain lab scope – intro and build proficiency with ChemCAD**
  - **Maintain the flash distillation lab; struggled with Txy diagrams**
- ❑ **Maintain writing assignment (basic literature review)**
- ❑ **Maintain capstone project (not done since AY19)**
- ❑ **Maintain 2-lesson sequence on VLE; good setup for CH363**
- ❑ **Remove Lesson 3 drop; reinforce units (SI, US customary), dimensional analysis, process variables (mol vs. lb-mol, force, pressure, etc.)**
- ❑ **Spread out problem sets to a frequency of 1 per 3 lessons (~10 days).**
- ❑ **Develop new PS problems, with heavy reliance on MMA/Matlab and multiple concepts**
- ❑ **Reduce scope of WPR III**
  - **Focus on enthalpy table development & application**
  - **Used a required MB to get to the solution**
  - **Reduce reliance on MMA/Matlab/Excel for major graded events**



- ❑ **AY22-2 Course average: 87.71 %**
- ❑ **Need to maintain in-class example problems for each lesson since most of questions from cadets were raised during problem demo session.**
- ❑ **Need to maintain block review/problem solving days before WPRs or TEE.**
- ❑ **For AY22-2, Capstone project (as a team) focused on the recent trend in the development of chemical engineering disciplines:**
  - **Literature review and presentation brief on the findings.**
  - **~50% of Capstone presentation brief was related to bioengineering field.**
- ❑ **Changed many of problems in the problem sets, WPRs, and TEE.**
  - **Need to reduce/adjust the length of problem sets.**
  - **The goal is to build a giant library of legacy problems, which can be utilized by future instructors in time-efficient manners.**
- ❑ **Reduce reliance on MMA, but at the same time, need to facilitate cadets' understanding of how to convert the CH364 concepts into the mathematical models (specifically, ODE solvers).**



## **Sustain:**

- ✓ **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.**
- ✓ **Introduce the fired heater capstone. Spread capstone throughout semester; place key parts(linearization, controller design) and associated IPRs near those lessons in the sequence. (this part still needs refining)**
- ✓ **Continue use of SSI for describing/demonstrating dynamic behavior, stability, controller design, and tuning.**

## **Improve:**

- ✓ **Spend more time designing valves and relating that to controller action.**
- ✓ **More time on rigorous stability methods (root locus plots, bode plots) These need to be incorporated into the practical exercises for more repetitions.**
- ✓ **\*\*Add .5 credit hours to the course and add a lab period. This will allow for more repetitions and a deeper dive. It is in line with other institutions.**
- ✓ **To facilitate a deeper understanding and engineering intuition, relate controllers and modeling to electrical circuits learned in EE301.**



## **Sustain:**

- ☐ **21/23 Cadets Passed the FEE Overall.**
- ☐ **CH400 serves to assess if cadets have mastery over program material and simultaneously prepare for FEE**
- ☐ **Cadets appreciated entire lesson of probability and statistics review**
- ☐ **Kaplan/PPi2Pass for quizzes and problem sets**
- ☐ **Continue to maintain rigor of the subject area quizzes each week**
- ☐ **DIST Simulator**
- ☐ **General chemistry review**

## **Improve**

- ☐ **Add additional SSI-Simulator HW/PE...mechanism to review of controls**
- ☐ **Cadets want more in class time to review quizzes and graded events**
- ☐ **Tremendous amounts of discomfort due to poor performance on quizzes/WPR**
- ☐ **Some cadets avoided AI and relied on studying with short time to adequately prepare**



## Sustain:

- ❑ Capstone project - Use of research topics to supplement the design; incorporation of curricular content is good; good fit with curriculum.
- ❑ Use of MS Teams and channels to facilitate collaboration.

## Improve:

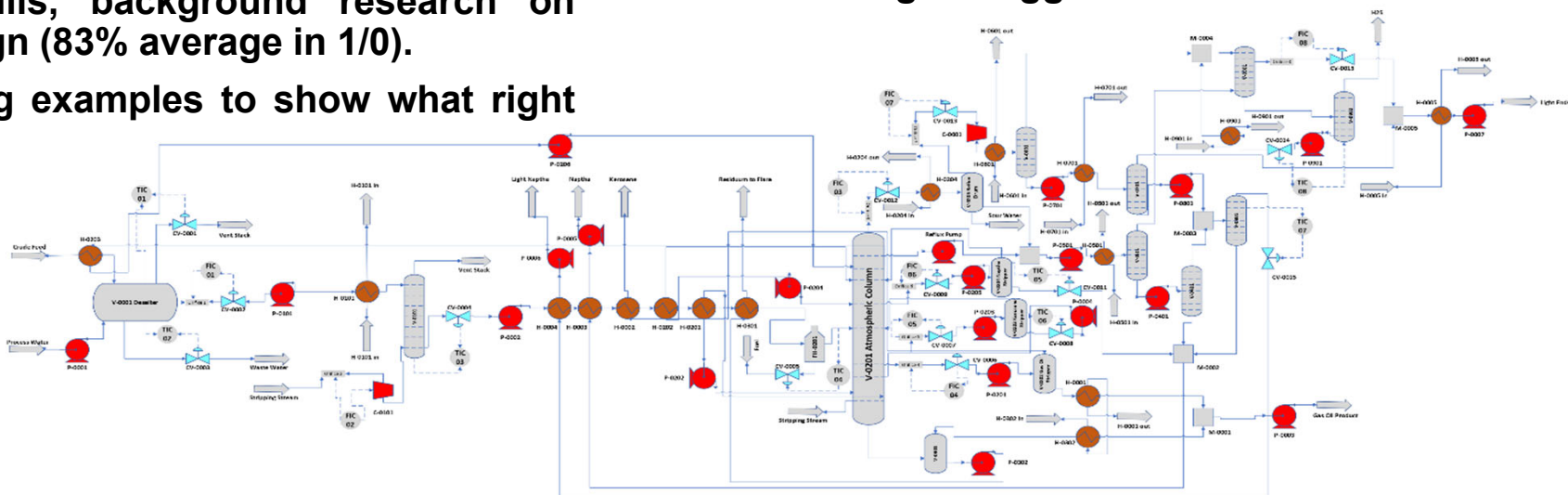
- ❑ Communication – 1/8 poor reports, 2/8 excellent. Always room for improvement!
- ❑ Identify control points and draw P&IDs (80% course average in 1/0).
- ❑ Research skills, background research on process design (83% average in 1/0).
- ❑ Use of writing examples to show what right looks like.

## Research:

Four domains required research:

- (1) Constraints on sulfur and water content.
- (2) Context and logistics.
- (3) Sustainability.
- (4) Contemporary issues in fuels.

- ❑ Currently only two rubric columns (2 and 4) scored ability to perform research. Sustainability was included at the top level of the context rubric. Constraints were included at the top level of the design rubric. These four items could be broken out to make them more explicit in the context of acquiring new knowledge. Suggest modifications to rubric.







1. **Course Directors Handbook for all administrative guidance and SOP**
  - ☐ **EXSUM on Dept Sharepoint to include **Course AAR Slides****
  - ☐ **Course Assessment Due 30 days after semester completion**
2. **Send All Major Graded Events to Course Supervisor for Review/Feedback**
3. **Continuing to update our courses**
  - ☐ **Capstone, labs, problem sets**
3. **Evaporator from Hampden Eng: TDY in June 10 or 13<sup>th</sup>**
  - ☐ **Stand up instrument and faculty opportunity to run/calibration**
  - ☐ **CH459 Labs must be done year around – Mr. Mathew and Dr. Nagelli**
4. **Conferences and Collaborative Manuscripts**
  - ☐ **AICHE Fall 2022 in Phoenix, AZ – Undergrad poster competition for cadets to compete: **AUG22****
  - ☐ **Chemical Education and Research Manuscripts with Team effort**



UNITED STATES MILITARY ACADEMY  
**WEST POINT**

# Extra Slides