



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

**REPLY TO
ATTENTION OF
MADN-CLS**

17 September 2020

MEMORANDUM THRU COL F. John Burpo, Department Head, Department of
Chemistry and Life Science, United States Military Academy, West Point, NY 10996

FOR Dean of the Academic Board, United States Military Academy, West Point, NY
10996

SUBJECT: 2020 Executive Summary of Chemical Engineering (CEN1) Program
Assessment

1. This memorandum is an executive summary, per *DPOM 5-07 Assessment of Student Learning in the Academic Program*, outlining the changes in the Chemical Engineering Program's assessment and assessment process, as well as curriculum changes, that have occurred since the last executive summary in September 2019, in response to program assessment.

a. The Chemical Engineering Program made no new recommendations for curricular changes during AY20. Of note, this is the second AY in which we offered the CEN1 program. Previous years had been under the CEN0 program.

(1) The last major curricular change in our program was to add CH367 – Introduction to Automatic Process Control to the Chemical Engineering major in AY17. The inaugural offering of CH367 successfully occurred in AY19-2, and this course is now an ongoing course offering. We continue to track process control on the FE exam to determine if this course has improved cadet performance with respect to the national average.

(2) The standard 8TAP that reflects the curriculum is shown in Enclosure 1.

b. Course Student Outcomes (SO) Assessment:

(1) For AY20, the Chemical Engineering Program continued to assess performance against the SOs required by ABET and implemented in AY19. The updated assessment process was fully described in the 2019 Executive Summary of Chemical Engineering (CEN1) Program and more fully described in the 2019 ABET Self-Study.

(2) The SO assessment process requires analysis of our assessment data pack, followed by discussions among faculty members, advisory board members, and students. The assessment data pack for AY20 is included in Enclosure 2, which references the attached document "Encl 2 - exsum_CEN1_2020-07_Final." The

assessment process is not complete until our advisory board meets after Spring Break. An assessment will be submitted upon completion of our process. The FEE exam process was severely impacted by the COVID-19 crisis. Of note, the performance of cadets on the Fundamentals of Engineering Exam (FEE) during AY20 was 8/10 (80%) cadets passing first try, above this year's national chemical engineering average pass rate of 75%. Only 10 cadets were able to take the FEE due to Covid-19 Test Center shut down implemented late in the spring semester.

(3) FE exam data for Student Outcome 8 show an improvement this year in use of computational tools (See Appendix 3 for FEE data comparison to previous years). However, we were below the national average in all other topics. We believe this was due to the small number of cadets who took the exam coupled with the very low performance of the two cadets who failed. Upon de-briefing, we found that one of these cadets left 35 problems blank and forgot to guess randomly on them. The two very low scores were averaged into the collective producing the negative bias.

(4) AY20 was the fifth iteration of the CH365 Chemical Engineering Thermodynamics course. This course was introduced to address low performance in thermodynamics on the FEE observed prior to AY16. For AY20, the CEN1 average was below the national average low but still within the standard deviation of the national average. We also still believe that there is a net upward trend in performance (not including the AY20) when observed over the past five years. Therefore, it appears that this historical weakness in our program's performance in chemical engineering thermodynamics has been corrected by the addition of this course. Continued assessment will need to occur in subsequent years to ascertain whether this upward trend is sustained.

(5) The remaining topics on the FE exam were generally within historical variations and/or standard deviations.

(6) During AY20 the program introduced the 1/0 rubrics to assist course directors in more precisely defining embedded indicators. The program also required instructors, starting in AY19-2, to include justifications for correlations in the 1/0 spread sheet. This is ongoing for ABET re-accreditation efforts.

c. CH450 Bioengineering Modeling and Analysis was added to the 2024 Redbook as an approved elective for chemical engineering.

d. The Chemical Engineering program is not proposing any significant curricular changes moving into AY21. The program will be executing the same academic schedule as AY20, with one course, CH485 – Heat and Mass Transfer will stay a 30-lesson, 75-minute, course for AY21. There will be some COVID-19 scheduling modifications to length of class, and time between classes.

e. Other than the stated change to the assessment process to reflect ABET accreditation criteria, there are no planned changes to the Chemical Engineering program's assessment process.

f. Assessment schedule. The program assessment process is currently in progress. The process is initiated during the summer when the data assessment packet is distributed to faculty for analysis. Program assessment for AY20 will be complete by 1 JUN 2021 (following our next advisory board meeting, at which time the board will evaluate the program data of AY2020) and an update will be added as an Appendix to this Executive Summary. The planned Advisory Board meeting for AY21 will occur in late April or early May 2021.

g. The ABET record year was AY19-20 with the onsite visit during the fall of 2020. The visit will be remote and is scheduled for 15-19NOV20.

h. The transition to remote learning did not cadet affect attainment of course and program learning outcomes and we do not see any gaps in learning that need to be addressed during AY21 and beyond at this time.

2. Point of contact for this action is the AY20 Chemical Engineering Program Director, LTC Matthew Armstrong, at x8555.

3 Enclosures

1. Approved CEN1 8TAP
2. Assessment Process and Data
3. FEE Topical Outcomes Evaluation

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MATTHEW J. ARMSTRONG
LTC, FA52
Chemical Engineering Program Director (AY20)

**Enclosure 1 to 2020 Executive Summary of Chemical Engineering Program
Assessment: Approved CEN1 8TAP**

CEN1 - Class of 2021

4th Class Year Fall Term	Spring Term	3rd Class Year Fall Term	Spring Term	2nd Class Year Fall Term	Spring Term	1st Class Year Fall Term	Spring Term
<i>E</i> MA103 4.0	<i>E</i> MA104 4.5	<i>E</i> MA205 4.5	<i>R</i> CH362 3.5	<i>R</i> CH363 3.5	<i>R</i> CH364 3.5	<i>D,R</i> CH459 3.5	CH402 3.0
EV203/ CH101 4.0	<i>R</i> CH101/ PH205 4.0	<i>R</i> PH205/ PH206 4.0	<i>R/</i> EV203/ PH206 4.0	<i>R</i> EE301 3.5	CH367 3.0	CH365 3.0	CH400 1.5
EN101 3.0	EN102 3.0	<i>R</i> CH102 4	MA364/5 3.0	<i>R</i> CH383 3.5	MC312 3.0	<i>R</i> CH485 3.5	Engr Elective 3.0
IT105 3.0	PL100 3.0	<i>E</i> DFL1 4.0	PY201 3.0	MC311 3.5	MC300 3.0	Engr Elective 3.0	LW403 3.5
HI105 3.0	HI108 3.0	<i>R</i> SS201 3.5	<i>E</i> DFL2 4.0	PL300 3.0	SS307 3.5	Engr Elective 3.0	<i>R</i> HI302 3.0
			<i>R</i> SS202 3.5	MA206 3.0			MX400 3.0

D = Double blocked course

R = RSTU lab course

E = Meet every day for 55 minutes

	Course should not be moved from that year or term
	Course may be scheduled in the fall or spring of that academic year
	Complementary Support Courses
	Core Engineering Sequence (not applicable)
	Course 3 Science Depth
	Course 9 STEM Depth
	other electives - most popular electives are templated

**Enclosure 2 to 2020 Executive Summary of Chemical Engineering Program
Assessment: Assessment Process and Data**

This document is a separate file entitled Encl 2 - exsum_CEN1_2020”

This file was published to the program on 22 July 2020. An updated file containing Faculty, Advisory Board, and Program Director survey data and input will be published o/a 1 June 2021.

Enclosure 3 to 2020 Executive Summary of Chemical Engineering Program Assessment: FEE Topical Outcomes Evaluation

Topical Outcomes Evaluation

Deviations from National Averages
AY07 to AY20

