

2023 Cadet Program Briefing Surveys (Completed by Firsties in AY24-2)

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- Review the chemical engineering program objectives on page two, and complete page 4 of the survey. For this part of the survey, we are interested in your opinions on the relevance of the objectives and their consistency with the Academy mission and needs of the Army. Again, for each row, mark the survey form with an "x" in the box that most closely represents your opinion and enter one response per row.
- There are some free-form questions on page 5 for you to comment on the quality of the curriculum, the meeting itself or any other items you would like us to address.
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Signature:



Mission: The mission of the chemical engineering program is to prepare commissioned leaders of character who are proficient in applying chemical and engineering principles to solve problems in a complex operational environment.

Chemical Engineering Program Objectives: During a career as commissioned officers in the United States Army and beyond, program graduates:

- Demonstrate effective leadership and chemical engineering expertise.
- Contribute to the solution of infrastructure or operational problems in a complex operational environment.
- Succeed in graduate school or other advanced study programs.
- Advance their careers through clear and precise technical communication.

Chemical Engineering Student Outcomes: On completion of the chemical engineering program, our graduates will be able to:

- Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
- Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.
- Acquire and apply new knowledge as needed, using appropriate learning strategies.
- Understand the chemical engineering curriculum, including:
 - Chemistry,
 - Material and energy balances,
 - Safety and environmental factors,
 - Thermodynamics of physical and chemical equilibria,
 - Heat, mass, and momentum transfer,
 - Chemical reaction engineering.
 - Continuous and staged separation operations.
 - Process dynamics and control.
 - Modern experimental and computing techniques.
 - Process design.

Part I. Student Outcomes. Check the box that most closely represents your opinion.

The cadets who graduated last year have demonstrated that they	Strongly Disagree	Neutral	Strongly Agree
• Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.			X
• Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.		X	
• Communicate effectively with a range of audiences.	X		
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.		X	
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.		X	
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			X
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			X
• Understand the chemical engineering curriculum.			X

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.		X	
The program objectives are consistent with the needs of the Army.		X	
The program curriculum supports the program objectives.		X	
The student outcomes are consistent with the program mission and objectives.		X	
The program has a process for periodically assessing the achievement of its student outcomes.		X	
The survey methods used by the program are effective.		X	
The cadets in the program are aware of the program objectives.		X	
The cadets are given an opportunity to provide their opinion about the program objectives.		X	
The cadets are satisfied with the courses in the program.		X	
In my opinion, the faculty are aware of the program objectives.		X	
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.		X	

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

- Adapt CH400 to include ethical implications of our work. Likewise, the various environmental, economic, social, etc. impacts in this field. I feel that we blow right over this when there are countless lessons we can learn from past failures.
- EES01 Adoption in CLS

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

- Asking directly about objectives is very clear & easy for us to reflect on since each class goes over these objectives on a continual basis.
- Ask about how we feel prepared for commissioning through critical thinking
- Asking about required courses from other departments specifically

Please add any additional comments that you would like to make below.

- 2nd Semester Firstie Year feels like we are having the FEE crammed down our throats. This is fine, but I feel it ignores final Mentorship we can receive before commissioning. CH400 Should become Semester long with the Second half dedicated to preparing for the professional world (both Army + Industry).

Name:

Jumair Bennett

Date: 1/24/24

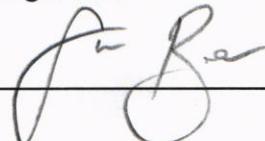
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Name: Jumur Bennett

Date: 1/20/24

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Name: Jumur Bennett

Date: 1/20/24

Part I. Student Outcomes. Check the box that most closely represents your opinion.

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• Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.			✓
• Communicate effectively with a range of audiences.			✓
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.			✓
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			✓
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			✓
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			✓
• Understand the chemical engineering curriculum.			✓

Name: Jessica Bennett

Date: 1/26/24

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			✓
The program objectives are consistent with the needs of the Army.			✓
The program curriculum supports the program objectives.			✓
The student outcomes are consistent with the program mission and objectives.			✓
The program has a process for periodically assessing the achievement of its student outcomes.			✓
The survey methods used by the program are effective.			✓
The cadets in the program are aware of the program objectives.			✓
The cadets are given an opportunity to provide their opinion about the program objectives.			✓
The cadets are satisfied with the courses in the program.			✓
In my opinion, the faculty are aware of the program objectives.			✓
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.			✓

Name: Jenny Bennett

Date: 1/20/24

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

Yes. The courses that I feel like I didn't get as much out of them as I should have are predominantly taught by other departments (engineering math, fluids)

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

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• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			✓
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			✓
• Acquire and apply new knowledge as needed, using appropriate learning strategies.		✓	
• Understand the chemical engineering curriculum.			✓

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	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			✓
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The cadets are given an opportunity to provide their opinion about the program objectives.			✓
The cadets are satisfied with the courses in the program.		✓	
In my opinion, the faculty are aware of the program objectives.			✓
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Name: _____

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Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

I think Controls could be a 2 semester class so that it can move at an easier pace so cadets can better understand. I think the classes taught in the Mech department would be better taught in this department.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

Make it digital

Please add any additional comments that you would like to make below.

N/a

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• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			✗
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			✗
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			✗
• Understand the chemical engineering curriculum.			✗

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			X
The program objectives are consistent with the needs of the Army.			X
The program curriculum supports the program objectives.			X
The student outcomes are consistent with the program mission and objectives.			X
The program has a process for periodically assessing the achievement of its student outcomes.			X
The survey methods used by the program are effective.			X
The cadets in the program are aware of the program objectives.			X
The cadets are given an opportunity to provide their opinion about the program objectives.			X
The cadets are satisfied with the courses in the program.			X
In my opinion, the faculty are aware of the program objectives.			X
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.			X

Name: _____

Date: _____

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

Yes, I feel like a materials class would be useful.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

Yes. No.

Please add any additional comments that you would like to make below.

Loved the majors.

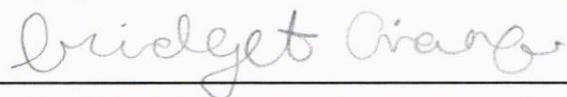
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• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			X
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• Acquire and apply new knowledge as needed, using appropriate learning strategies.			X
• Understand the chemical engineering curriculum.			X

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	Strongly Disagree	Neutral	Strongly Agree
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The cadets are given an opportunity to provide their opinion about the program objectives.			X
The cadets are satisfied with the courses in the program.			X
In my opinion, the faculty are aware of the program objectives.			X
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.			X

Name: _____

Date: _____

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

N/A, but MC300 was def not necessary.
Otherwise, I think the other classes are great.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

Maybe instead of "Strongly disagree/neutral/
Strongly agree", we could add "Slightly agree"
+ "Slightly disagree".

Please add any additional comments that you would like to make below.

N/A.

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- Succeed in graduate school or other advanced study programs.
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 - Process dynamics and control.
 - Modern experimental and computing techniques.
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Part I. Student Outcomes. Check the box that most closely represents your opinion.

The cadets who graduated last year have demonstrated that they	Strongly Disagree	Neutral	Strongly Agree
• Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.			X
• Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.			X
• Communicate effectively with a range of audiences.			X
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.			X
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			X
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			X
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			X
• Understand the chemical engineering curriculum.			X

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Agree	Strongly Agree
The program objectives are consistent with the USMA mission.				X
The program objectives are consistent with the needs of the Army.				X
The program curriculum supports the program objectives.				X
The student outcomes are consistent with the program mission and objectives.				X
The program has a process for periodically assessing the achievement of its student outcomes.				X
The survey methods used by the program are effective.			X	
The cadets in the program are aware of the program objectives.				X
The cadets are given an opportunity to provide their opinion about the program objectives.				X
The cadets are satisfied with the courses in the program.			X	
In my opinion, the faculty are aware of the program objectives.				X
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.				X

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

We could remove MC300 and replace it with a more relevant class. Maybe CE350. Add a class early on that teaches the how changes how to effectively use and understand mathematics.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year? Add more in between options on page 3-4:

strongly
disagree neutral agree strongly ↗
Agree ↘

Ask questions about specific classes and how to improve them.

Please add any additional comments that you would like to make below.

Maybe have more outside guests and meetings during lunch to see corporate or executive/professor perspectives. Have meetings with faculty and first-year class during lunch.

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Part I. Student Outcomes. Check the box that most closely represents your opinion.

The cadets who graduated last year have demonstrated that they	Strongly Disagree	Neutral	Strongly Agree
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• Communicate effectively with a range of audiences.			X
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.			X
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			X
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			X
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			X
• Understand the chemical engineering curriculum.			X

Name: _____

Date: _____

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			X
The program objectives are consistent with the needs of the Army.	X		
The program curriculum supports the program objectives.			X
The student outcomes are consistent with the program mission and objectives.			X
The program has a process for periodically assessing the achievement of its student outcomes.			X
The survey methods used by the program are effective.	X		
The cadets in the program are aware of the program objectives.			X
The cadets are given an opportunity to provide their opinion about the program objectives.			X
The cadets are satisfied with the courses in the program.	X		
In my opinion, the faculty are aware of the program objectives.			X
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.			X

Name: _____

Date: _____

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

There should be an overview class that tells us the situations/environments that each class is directly applicable to.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

Leave a comment section below each Agree/disagree
Check point that is optional.

Please add any additional comments that you would like to make below.

There was not much overlap between '23 & '24
So I am not fully sure on my ranking because
I did not know all the '23 ClnEs.

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Part I. Student Outcomes. Check the box that most closely represents your opinion.

The cadets who graduated last year have demonstrated that they	Strongly Disagree	Neutral	Strongly Agree
• Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.			X
• Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.			X
• Communicate effectively with a range of audiences.		X	
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.		X	
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			X
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			X
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			X
• Understand the chemical engineering curriculum.			X

Name: _____

Date: _____

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			X
The program objectives are consistent with the needs of the Army.			X
The program curriculum supports the program objectives.			X
The student outcomes are consistent with the program mission and objectives.			X
The program has a process for periodically assessing the achievement of its student outcomes.			X
The survey methods used by the program are effective.			X
The cadets in the program are aware of the program objectives.			X
The cadets are given an opportunity to provide their opinion about the program objectives.			X
The cadets are satisfied with the courses in the program.			X
In my opinion, the faculty are aware of the program objectives.			X
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.			X

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

- Add a class on MMA plebe year
- Maybe a second controls class/elective

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

- If you were to go back, would you pick CIVET as your major again?
- Make the Survey online and add the data from our class to the slides

Please add any additional comments that you would like to make below.

- Making it possible for us to take skiing/snowboarding would be a great addition and would improve morale! ☺
- Let COL James teach more classes
- Finding ways to make it possible for CIVET majors to study abroad

Name: Caleb Johnson

Date: 25JAN23

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Part I. Student Outcomes. Check the box that most closely represents your opinion.

The cadets who graduated last year have demonstrated that they	Strongly Disagree	Neutral	Strongly Agree
• Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.	X		
• Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.	X		
• Communicate effectively with a range of audiences.	X		
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• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.	X		
• Acquire and apply new knowledge as needed, using appropriate learning strategies.	X		
• Understand the chemical engineering curriculum.	X		

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.	X		
The program objectives are consistent with the needs of the Army.	X		
The program curriculum supports the program objectives.	X		
The student outcomes are consistent with the program mission and objectives.	X		
The program has a process for periodically assessing the achievement of its student outcomes.	X		
The survey methods used by the program are effective.	X		
The cadets in the program are aware of the program objectives.	X		
The cadets are given an opportunity to provide their opinion about the program objectives.	X		
The cadets are satisfied with the courses in the program.	X		
In my opinion, the faculty are aware of the program objectives.	X		
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.	X		

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

Yes, the course schedule is great. Instead of MC300, mixing in an additional math course (Linear Algebra) could help in future endeavors.

Or, freeing MC300 to slot in an additional Engineering-based elective could help like additional Fluids courses/thermo classes.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

Yes, this survey was adequate in analyzing the course.

Please add any additional comments that you would like to make below.

Given the time constraints of 4-years and 0740-1630 everyday the course load is great and really comes together as a firstie. I would have liked to take more courses in Fluids/Thermo and Controls if there is any way to open class selections up by freeing

EE or MB300 courses in the curriculum.

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Name: _____

Date: _____

Part I. Student Outcomes. Check the box that most closely represents your opinion.

The cadets who graduated last year have demonstrated that they	Strongly Disagree	Neutral	Strongly Agree
• Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.			✓
• Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.			✓
• Communicate effectively with a range of audiences.			✓
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.		✓	
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			✓
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• Acquire and apply new knowledge as needed, using appropriate learning strategies.			✓
• Understand the chemical engineering curriculum.			✓

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	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			✓
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The program has a process for periodically assessing the achievement of its student outcomes.			✓
The survey methods used by the program are effective.		✓	
The cadets in the program are aware of the program objectives.			✓
The cadets are given an opportunity to provide their opinion about the program objectives.			✓
The cadets are satisfied with the courses in the program.	✓		
In my opinion, the faculty are aware of the program objectives.			✓
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.	✓		

Name: _____

Date: _____

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

I think the right classes are taught. I wish that there was more classes like CH 459 for more experiments but I am well prepared and each class builds off each other.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

More questions about specific classes we take should be added. People have strong opinions on some classes.

Please add any additional comments that you would like to make below.

N/A

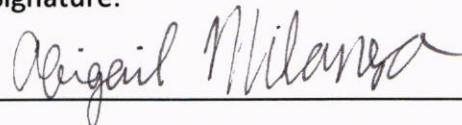
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Signature:

A handwritten signature in black ink that reads "Abigail Milanesa". The signature is written in a cursive style with a clear, legible font.

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 - Process design.

Part I. Student Outcomes. Check the box that most closely represents your opinion.

The cadets who graduated last year have demonstrated that they	Strongly Disagree	Neutral	Strongly Agree
• Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.			X
• Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.		X	
• Communicate effectively with a range of audiences.			
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.			X
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			X
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			X
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			X
• Understand the chemical engineering curriculum.			X

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			X
The program objectives are consistent with the needs of the Army.			X
The program curriculum supports the program objectives.			X
The student outcomes are consistent with the program mission and objectives.			X
The program has a process for periodically assessing the achievement of its student outcomes.			X
The survey methods used by the program are effective.			X
The cadets in the program are aware of the program objectives.			X
The cadets are given an opportunity to provide their opinion about the program objectives.			X
The cadets are satisfied with the courses in the program.			X
In my opinion, the faculty are aware of the program objectives.			X
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.			X

Name: _____

Date: _____

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

Can we not take MC300? I do not see a point in taking it. We already take Physics 1 which.

I think splitting up Controls or heat + mass into 2 semesters, that might be better.

Have cadets plebe year put in preference to take Chem 1/2 plebe year so Orgo can be taken yearling year rather than COW year when there is not enough time in the day to fully learn Orgo.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

N/A

Please add any additional comments that you would like to make below.

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• Communicate effectively with a range of audiences.			X
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.		X	
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			X
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			X
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			X
• Understand the chemical engineering curriculum.			X

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			X
The program objectives are consistent with the needs of the Army.			X
The program curriculum supports the program objectives.			X
The student outcomes are consistent with the program mission and objectives.			X
The program has a process for periodically assessing the achievement of its student outcomes.			X
The survey methods used by the program are effective.			X
The cadets in the program are aware of the program objectives.			X
The cadets are given an opportunity to provide their opinion about the program objectives.			X
The cadets are satisfied with the courses in the program.			X
In my opinion, the faculty are aware of the program objectives.			X
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.			X

Name: _____

Date: _____

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

I do not believe a course should be added to the curriculum. I believe that each class in the curriculum contributes to the achievement of the Chemical Engineering Student Outcomes.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

The right questions are being asked.

Please add any additional comments that you would like to make below.

At each Chem E student Outcome, I can think of a specific part of the curriculum that contributes to the achievement of that outcome.

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• Communicate effectively with a range of audiences.	✓		
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	✓		
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			✓
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			✓
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			✓
• Understand the chemical engineering curriculum.			✓

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.		✓	
The program objectives are consistent with the needs of the Army.		✓	
The program curriculum supports the program objectives.			✓
The student outcomes are consistent with the program mission and objectives.			✓
The program has a process for periodically assessing the achievement of its student outcomes.		✓	
The survey methods used by the program are effective.		✓	
The cadets in the program are aware of the program objectives.			✓
The cadets are given an opportunity to provide their opinion about the program objectives.			✓
The cadets are satisfied with the courses in the program.		✓	
In my opinion, the faculty are aware of the program objectives.			✓
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Name: _____

Date: _____

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

* MC300 isn't really applicable to ChemE
* EE301 isn't really applicable to ChemE

I would like the bioengineering minor to be formally approved. I joined ChemE because it's applicable to bioengineering

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

maybe focus on what classes need to focus on Chem E concepts

Please add any additional comments that you would like to make below.

NIA

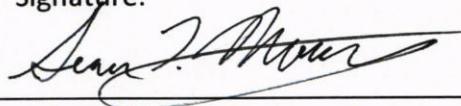
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Part I. Student Outcomes. Check the box that most closely represents your opinion.

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• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.		X	
• Acquire and apply new knowledge as needed, using appropriate learning strategies.		X	
• Understand the chemical engineering curriculum.		X	

Name: Tom Murray

Date: 26 Jan 24

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			X
The program objectives are consistent with the needs of the Army.			X
The program curriculum supports the program objectives.			X
The student outcomes are consistent with the program mission and objectives.			X
The program has a process for periodically assessing the achievement of its student outcomes.			X
The survey methods used by the program are effective.		X	
The cadets in the program are aware of the program objectives.			X
The cadets are given an opportunity to provide their opinion about the program objectives.			X
The cadets are satisfied with the courses in the program.			X
In my opinion, the faculty are aware of the program objectives.			X
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.	X		

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

Personally, I feel that the amount of classes is good. However, the program would benefit from the addition of an engineer design class earlier on in the curriculum to further extend our ability to then apply it to any design procedures we create.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

Another viewpoint to add to the survey could be the incorporation of technology into the program. It's an implied part of what engineers do and while our knowledge is extensive in ChemCAD and mathematics, we might benefit from greater exposure in programs such as MATLAB or other CAD systems.

Please add any additional comments that you would like to make below.

The overall program is very good and I have been pleased with my experience. I would just like to comment on the absolute necessity of certain classes we take from other disciplines (ie MC300), the objectives we need from these classes could be incorporated into designing a course that pertains more directly to chemist engineers.

Name: Maxwell Onager

Date: 24 JAN

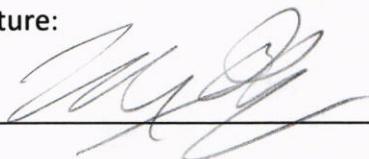
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Part I. Student Outcomes. Check the box that most closely represents your opinion.

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<ul style="list-style-type: none">Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.			X
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<ul style="list-style-type: none">Understand the chemical engineering curriculum.			X

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	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			X
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Name: Maxwell Onaga

Date: 24 JAN

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

In general, yes. I enjoy the current selection of classes & they apply directly to the FEE. One class I'd enjoy is a coding class to increase our proficiency using software such as Mathematica, Matlab, Excel. Also, while the ME classes directly apply, it seems that we struggle on it in the FEE, i.e Fluids.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

I think the questions are good! applicable directly to the program with focus on both USMA & ChemE OBJS. You could ask about research & faculty, though I understand the focus is on program content.

Please add any additional comments that you would like to make below.

Go Chem E! We love our faculty!

Name: Avery Paul

Date: Jan. 26

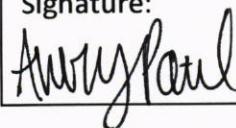
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- Demonstrate effective leadership and chemical engineering expertise.
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- Succeed in graduate school or other advanced study programs.
- Advance their careers through clear and precise technical communication.

Chemical Engineering Student Outcomes: On completion of the chemical engineering program, our graduates will be able to:

- Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
- Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
- Communicate effectively with a range of audiences.
- Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
- Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
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- Understand the chemical engineering curriculum, including:
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 - Heat, mass, and momentum transfer,
 - Chemical reaction engineering.
 - Continuous and staged separation operations.
 - Process dynamics and control.
 - Modern experimental and computing techniques.
 - Process design.

Part I. Student Outcomes. Check the box that most closely represents your opinion.

The cadets who graduated last year have demonstrated that they	Strongly Disagree	Neutral	Strongly Agree
• Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.			✓
• Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.			✓
• Communicate effectively with a range of audiences.		✓	
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.			✓
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			✓
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			✓
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			✓
• Understand the chemical engineering curriculum.			✓

Name: _____

Date: _____

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			✓
The program objectives are consistent with the needs of the Army.		✓	
The program curriculum supports the program objectives.			✓
The student outcomes are consistent with the program mission and objectives.			✓
The program has a process for periodically assessing the achievement of its student outcomes.			✓
The survey methods used by the program are effective.		✓	
The cadets in the program are aware of the program objectives.			✓
The cadets are given an opportunity to provide their opinion about the program objectives.			✓
The cadets are satisfied with the courses in the program.			✓
In my opinion, the faculty are aware of the program objectives.			✓
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.			✓

Name: _____

Date: _____

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

yes, we have a good understanding of all engineering disciplines. On top of all the West Point classes we are already required to take, any additional class would be too much.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

yes, the only area that could be emphasized more in depth or explained is what its like to be a practicing chemical engineer or the types of jobs we could find ourselves doing.

Please add any additional comments that you would like to make below.

N/A

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- Review the chemical engineering program objectives on page two, and complete page 4 of the survey. For this part of the survey, we are interested in your opinions on the relevance of the objectives and their consistency with the Academy mission and needs of the Army. Again, for each row, mark the survey form with an "x" in the box that most closely represents your opinion and enter one response per row.
- There are some free-form questions on page 5 for you to comment on the quality of the curriculum, the meeting itself or any other items you would like us to address.
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- **The surveys are due by the end of this hour (E or F-Hour) 26 January 2023.**
- Sign in the box below:

Signature:



Name: _____

Date: _____

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Chemical Engineering Program Objectives: During a career as commissioned officers in the United States Army and beyond, program graduates:

- Demonstrate effective leadership and chemical engineering expertise.
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- Succeed in graduate school or other advanced study programs.
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- Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
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 - Continuous and staged separation operations.
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 - Process design.

Part I. Student Outcomes. Check the box that most closely represents your opinion.

The cadets who graduated last year have demonstrated that they	Strongly Disagree	Neutral	Strongly Agree
• Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.			X
• Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.			X
• Communicate effectively with a range of audiences.		X	
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.		X	
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			X
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			X
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			X
• Understand the chemical engineering curriculum.	X		

Name: _____

Date: _____

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			X
The program objectives are consistent with the needs of the Army.			X
The program curriculum supports the program objectives.			X
The student outcomes are consistent with the program mission and objectives.			X
The program has a process for periodically assessing the achievement of its student outcomes.			X
The survey methods used by the program are effective.			X
The cadets in the program are aware of the program objectives.			X
The cadets are given an opportunity to provide their opinion about the program objectives.			X
The cadets are satisfied with the courses in the program.			X
In my opinion, the faculty are aware of the program objectives.			X
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.			X

Name: _____

Date: _____

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

I think the right classes are being taught but believe some topics such as Controls could use 2 semesters and Fluids and Thermo could be combined into 1 class.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

The right questions are being asked but it would be interesting to see which classes the students enjoyed the most and took the most away from.

Please add any additional comments that you would like to make below.

Name: Brady Weathers

Date: 26 JAN 23

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- Sign in the box below:

Signature:



Name: brady Weathers

Date: 26JAN24

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Part I. Student Outcomes. Check the box that most closely represents your opinion.

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• Communicate effectively with a range of audiences.		✓	
• Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.		✓	
• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			✓
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			✓
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			✓
• Understand the chemical engineering curriculum.			✓

Name: Brady Weathers

Date: 26 JAN 24

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			✓
The program objectives are consistent with the needs of the Army.			✓
The program curriculum supports the program objectives.			✓
The student outcomes are consistent with the program mission and objectives.			✓
The program has a process for periodically assessing the achievement of its student outcomes.			✓
The survey methods used by the program are effective.		✓	
The cadets in the program are aware of the program objectives.		✓	
The cadets are given an opportunity to provide their opinion about the program objectives.			✓
The cadets are satisfied with the courses in the program.			✓
In my opinion, the faculty are aware of the program objectives.			✓
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.			✓

Name: Brady Weathers

Date: 26 JAN 24

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

I believe the in-major courses are very well laid-out and effective. I do wish EE301 was replaced with a chemical-engineer-focused EE course. This would help significantly with understanding of controls.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

The only question I wish was asked more was the implications on society/environmental concerns.

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- Sign in the box below:

Signature:

A rectangular box containing a handwritten signature in black ink. The signature appears to read "Tristen Weaver".

Name: _____

Date: _____

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Part I. Student Outcomes. Check the box that most closely represents your opinion.

The cadets who graduated last year have demonstrated that they	Strongly Disagree	Neutral	Strongly Agree
<ul style="list-style-type: none">Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.			✓
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<ul style="list-style-type: none">Communicate effectively with a range of audiences.		✓	
<ul style="list-style-type: none">Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.			✓
<ul style="list-style-type: none">Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			✓
<ul style="list-style-type: none">Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			✓
<ul style="list-style-type: none">Acquire and apply new knowledge as needed, using appropriate learning strategies.			✓
<ul style="list-style-type: none">Understand the chemical engineering curriculum.			✓

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			✓
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The program curriculum supports the program objectives.			✓
The student outcomes are consistent with the program mission and objectives.			✓
The program has a process for periodically assessing the achievement of its student outcomes.			✓
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The cadets in the program are aware of the program objectives.			✓
The cadets are given an opportunity to provide their opinion about the program objectives.			✓
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In my opinion, the faculty are aware of the program objectives.			✓
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Name: _____

Date: _____

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

for the majority yes. More should be taught
out and potentially taken off.

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?

Yes.

Please add any additional comments that you would like to make below.

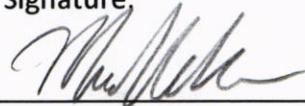
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• Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.			✓
• Develop and conduct appropriate experimentation, analyze, and interpret data, and use engineering judgment to draw conclusions.			✓
• Acquire and apply new knowledge as needed, using appropriate learning strategies.			✓
• Understand the chemical engineering curriculum.			✓

Part II. Program Objectives. Check the box that most closely represents your opinion.

	Strongly Disagree	Neutral	Strongly Agree
The program objectives are consistent with the USMA mission.			✓
The program objectives are consistent with the needs of the Army.			✓
The program curriculum supports the program objectives.			✓
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The cadets are satisfied with the courses in the program.		✓	
In my opinion, the faculty are aware of the program objectives.			✓
In my opinion, the faculty are given an opportunity to provide their opinion about the program objectives.			✓

Name: Michael Williams

Date: 26 JAN 23

Part III. Open Questions.

Are we teaching the right classes? Based on the assessment data or on your personal opinion, is there a course that the program should add to the curriculum?

Physical chemistry 1+2, remove ME301,
it is redundant with CH365 and CH362.

ME300 not needed

Are we asking the right questions? Do you have any suggestions to improve the survey for next year?



yes

Please add any additional comments that you would like to make below.

Chemical Engineering Program

Program Assessment Briefing

January 26, 2024

United States Military Academy
Department of Chemistry and Life Science

NOTES:

PROGRAM MISSION

The mission of the chemical engineering program is to prepare commissioned leaders of character who are proficient in applying chemical and engineering principles to solve problems in a complex operational environment.

NOTES:

Mission statement was written by advisory board and faculty reps during Advisory Board meetings.

PROGRAM VISION

We envision an Army that is prepared for all dimensions of modern warfare, drawing upon disciplined, highly trained chemical engineers to develop solutions to the challenges facing the nation.

1/23/2024

3

NOTES:

The vision statement is aspirational and describes what we want for our program.

AGENDA

ABET Criteria - 2-5 are monitored annually.

1. STUDENTS

- 5. CURRICULUM
- 4. CONTINUOUS IMPROVEMENT
- 3. STUDENT OUTCOMES
- 2. PROGRAM EDUCATIONAL OBJECTIVES
- 6. FACULTY
- 7. FACILITIES
- 8. SUPPORT
- 9. PROGRAM CRITERIA

(ABET Criteria 1-8)

NOTES: ABET Criteria Explained

Students: includes evaluation of performance, advising on curriculum and career matters, monitor progress.

Objectives: includes published objectives that are consistent with the institutional mission and ABET criteria, a process that periodically documents and demonstrates that the objectives are based on the needs of the constituencies, and an assessment and evaluation process that periodically documents and demonstrates the degree to which the objectives are attained.

Outcomes: includes program outcomes are ABET 1-7 plus additional outcomes articulated by the program, and an assessment and evaluation process that demonstrates and documents the degree to which outcomes are attained.

Continuous improvement: must show evidence of actions taken to improve the program and must be based on available information, such as Criterion 2 and 3 processes.

Curriculum: specifies subjects appropriate engineering but not specific courses, must be consistent with outcomes and objectives, and must include one year of college level mathematics and basic science, one and one half years of engineering science, and a general education (core) component that is consistent with the program and institutional goals.

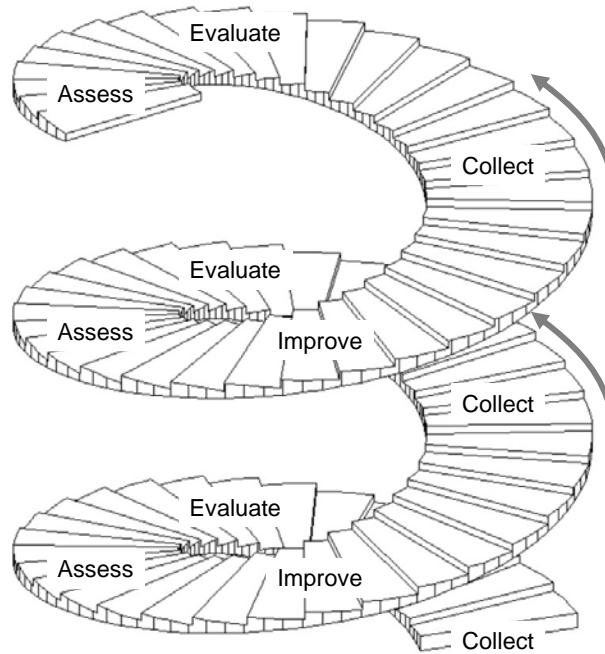
Faculty: must be of sufficient number and competencies for advising and counseling, student-faculty interaction, interactions with industrial and professional practitioners, and proper evaluation and guidance of program and program courses. Overall competences are based on enthusiasm, level of education, diversity, engineering experience, teaching experience, level of scholarship, professional society membership, and licensure.

Facilities: Classrooms, labs, and equipment must be adequate to accomplish program objectives (outcomes), must provide modern engineering tools, and computing and IT infrastructure must be in place.

Support: Institutional support, financial resources, and leadership must be adequate to assure the quality of the program, must be sufficient to attract, retain, and develop quality faculty, and support personnel must be adequate.

Program Criteria: Must satisfy additional criteria from professional societies

Assessment Cycle



NOTES:

Our assessment process is continuous and occurs on an annual cycle, during which we collect data, evaluate the data, assess the meaning of the data, and take steps where necessary to improve the program.

Definitions

Program Educational Objectives

Program educational objectives are broad statements that describe what graduates are expected to attain within a few years of graduation.

Student Outcomes

Student outcomes describe what students are expected to know and be able to do by the time of graduation (skills, knowledge, and behaviors).

1/23/2024

(ABET EAC Criteria)

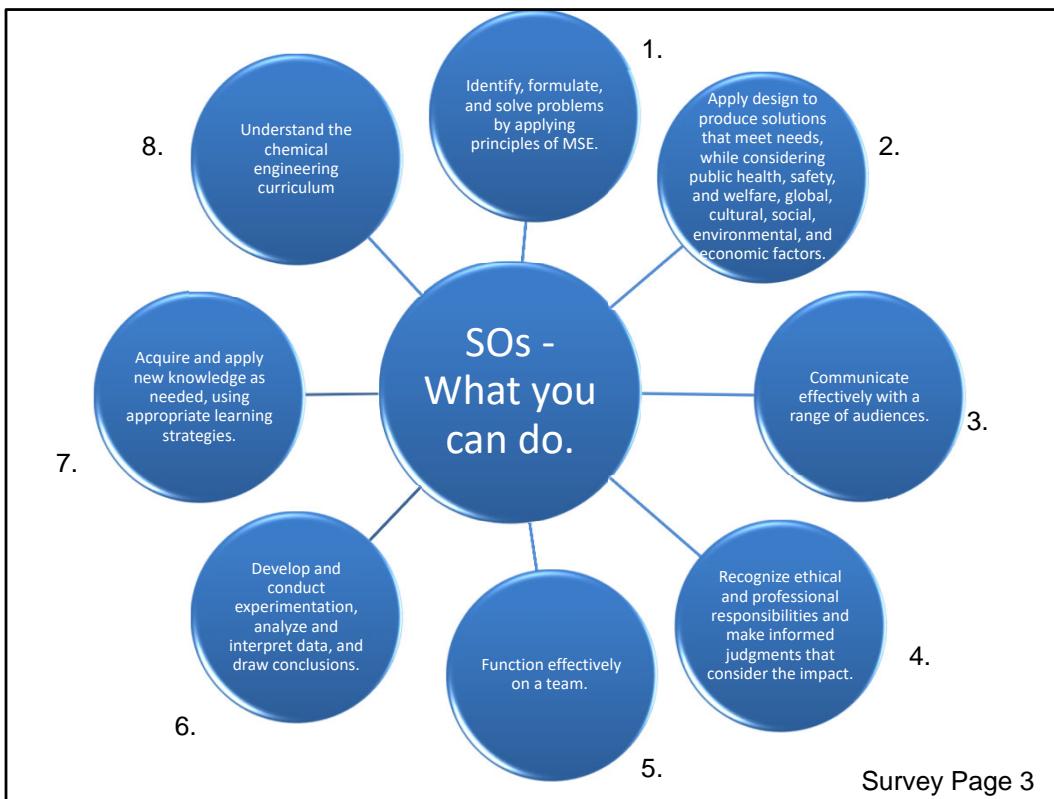
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NOTES:

The primary purpose of this meeting is to obtain your opinion on achievement of outcomes and relevance of objectives, and to document your opinions with a paper survey. The survey contains two parts (Part 1 and Part 2). Part 1 on the survey is on page 3 and covers “student outcomes.” Part 2 on page 4 covers “program objectives.”

Program outcomes are defined as statements of what the cadets can do at the point of graduation. These are required to be ABET outcomes (1) through (7) plus any additional outcomes articulated by the program (outcome 8).

Objectives are broad statements about career aspirations. Generally ,this is understood to be 3-5 years after graduation. In the case of the military academy, we generally understand this to be about 5-7 years after graduation. Later we will talk about objectives, but we do not assess achievement of objectives. Instead, we are assessing whether or not we have the right objectives.



NOTES:

Identical to ABET 1-7 plus one additional outcome (8)

On completion of the chemical engineering program, our graduates will be able to:

1. Identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics.
2. Apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.
3. Communicate effectively with a range of audiences.
4. Recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
5. Function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives.
6. Develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
7. Acquire and apply new knowledge as needed, using appropriate learning strategies.
8. Understand the chemical engineering curriculum, including chemistry, material and energy balances, safety and environmental factors, thermodynamics of physical and chemical equilibria, heat, mass, and momentum transfer, chemical reaction engineering, continuous and staged separation processes, process dynamics and control, modern experimental and computing techniques, and process design.

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NOTES:

Student outcomes are mandated by ABET, but we can add additional ones. The required outcomes are 1-7. Outcome 8 was added by us to track the content of the FE exam. Since this is a national exam, the content is reflective of the national curriculum.

- **Program Educational Objectives (PEOs)**
 - Gleaned by asking *program constituents*
 - For us: Army, profession, graduate schools, other
 - **Our external Advisory Board a key resource**
 - Desired professional accomplishments
of graduates 5-7 years after graduation
 - Adjust every 3 years or so...
- **Student Outcomes**
 - What students should be able to do **at graduation**
 - Must be **measurable**
 - Designed to lead naturally to the PEOs
 - Assess/evaluate some fraction yearly.
- **Assessment → Continuous improvement**
 - Collect meaningful data to evaluate performance indicators (PIs)
 - Assess PIs for outcome attainment → information → COAs for change
 - Implement change
 - Assess its effects and level of success ("closing the loop")
 - Repeat all the above
 - Periodically check and adjust both Student Outcomes and PEOs



NOTES:

ChemE “National” Curriculum (159 Programs)

Course / Content	National, 1994 ^a	National, 2012	USMA
Design	4.9	5.7	3.5
Laboratory	3.7	4.1	3.5
Reactor Design	1.9	3.1	3.5
Separations	3.2	3.0	3.5
Control	2.3	3.0	3.0
Material & Energy Balances	3.6	3.6	3.5
Transport Phenomena	11.7	6.3	7.0
Chemical Engineering Thermodynamics	4.2	4.8	3.5
Chemistry (excl. Phys. Chem.)	19.0	14.7	10.5
Physical Chemistry	6.4	3.0	0.0
Physics	7.7	7.7	7.0
Mathematics (through ODEs)	14.5	14.8	16.5
Computers / Programming	3.6	2.4	3.0
Statistics	3.0	1.0	3.0
Electrical Engineering	3.8	1.0	3.5
Civil Engineering	3.8	0.9	3.0

^aRonald N. Occhiogrosso and Banita Rana, *J. Chem. Eng. Ed.*, 184-187 (Summer 1996)

NOTES:

This table contains average credit hours of coverage in various topics common to chemical engineering programs. For example, the average credit hours in design is 5.7 across all 159 programs in the US. USMA is at 3.5, which is low, but it must be emphasized that we have elements of design in other courses. For example, CHEMCAD is taught across CH362, CH363, CH364, CH459, and CH402, whereas in almost all other programs, this coverage is consolidated into a single course.

USMA Chemical Engineering Curriculum

- MA364 Engineering Mathematics
- CH362 Mass & Energy Balances
- CH363 Separation Processes
- CH364 Chemical Reaction Engineering
- ME301 Thermodynamics
- MC362 Fluid Mechanics
- CH365 Chemical Engineering Thermodynamics
- CH485 Heat & Mass Transfer
- EE301 Fundamentals of Electrical Engineering
- CH367 Chemical Engineering Process Controls
- CH459 Chemical Engineering Laboratory
- MC300 Fundamentals of Engineering Mechanics & Design (Statics & Dynamics)
- CH383 Organic Chemistry I
- CH402 Chemical Engineering Process Design
- CH400 Professional Practice

3 Engineering Electives (3x bioengineering electives added last AY).

NOTES:

The required courses in the curriculum are listed here. The courses in the curriculum are the primary means by which we implement the program. The courses cause the outcomes. The outcomes feed into the objectives and the mission. The choice of courses carefully mimics the content of the FE Exam, which is a nationally normed public examination.

Assessment Instruments

Performance Data

Embedded Indicators

Transcripts

FE Exam

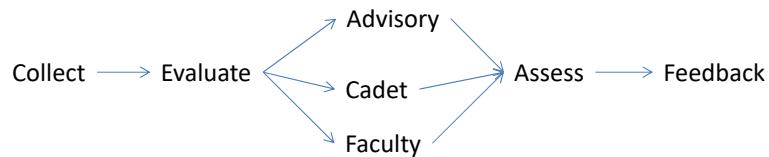
Program Surveys

Advisory Board

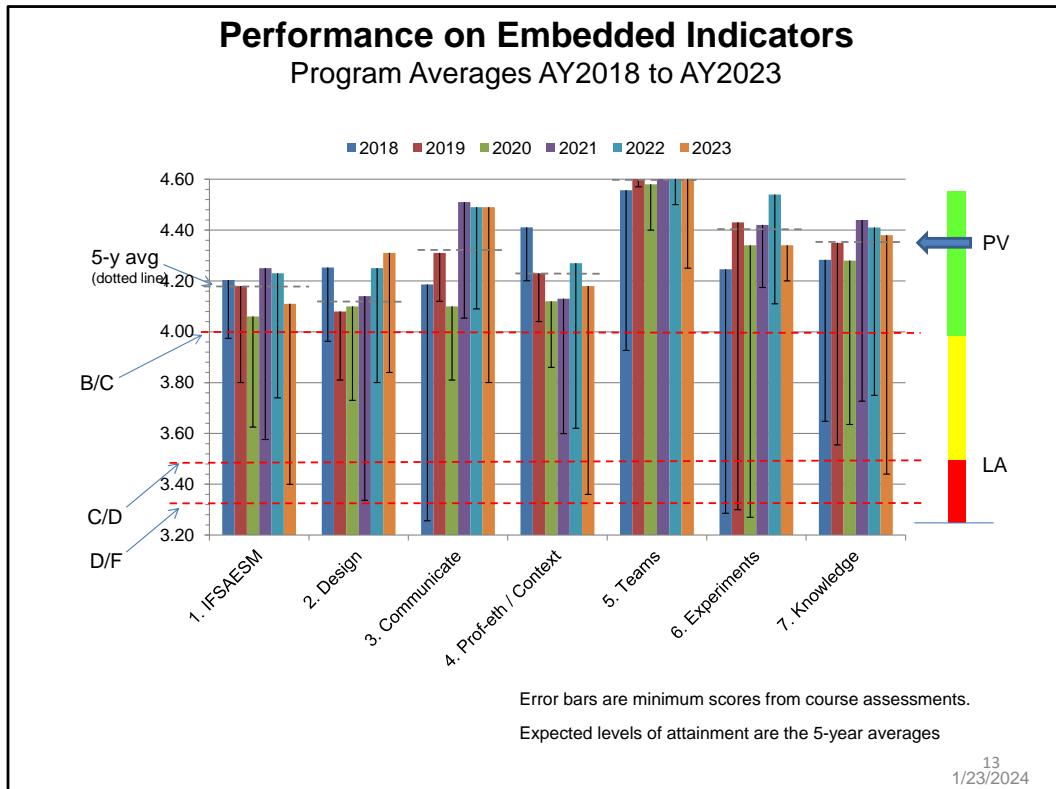
Faculty

Cadets

Process

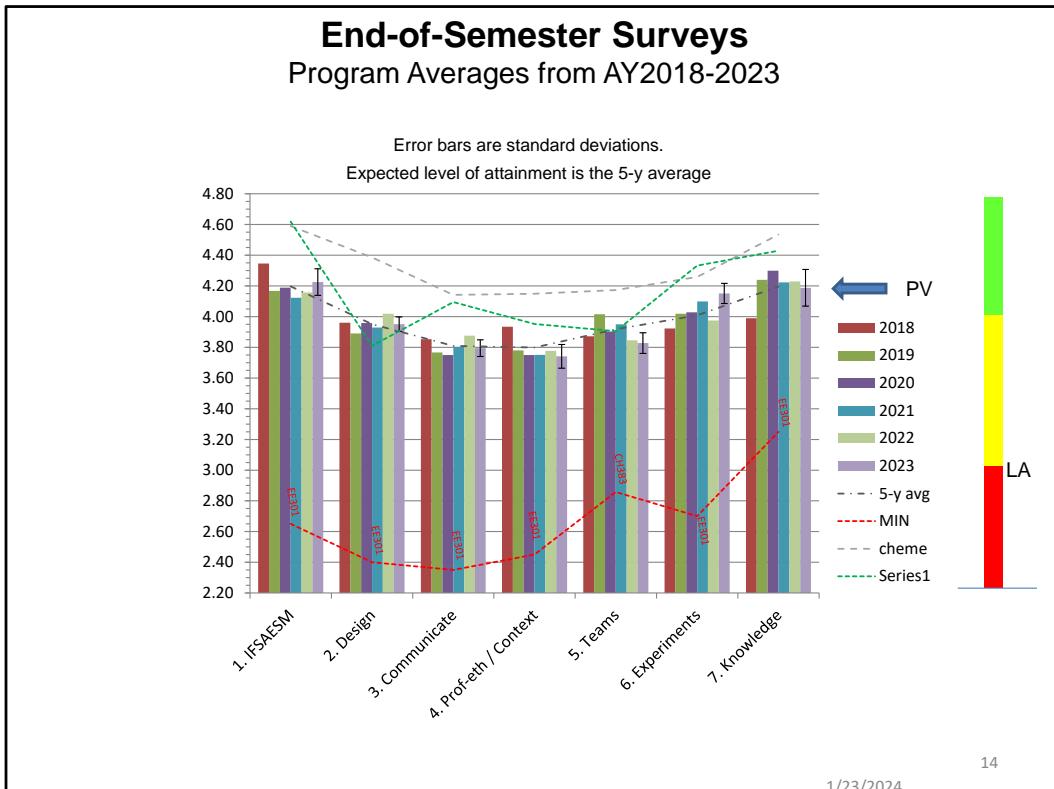


NOTES:



NOTES:

Slide updated 23 January 2024. Program averages are shown for all courses containing embedded indicators. The green, yellow, and red bars on the right mimic a process control indicator, where the 2023 score (orange vertical data bar ON THE RIGHT) is the measured process variable (PV), and the 5-year average is our performance goal (gray dotted line). The “low alarm” is indicated with “LA” and would trigger program (process) response. In the language of process control, our process is “in the green” for all outcomes. The error bars are minimum scores from courses AND THE CADETS ARE DOING VERY WELL by these indicators. For example, the orange bar for 2023 in outcome 1 shows a minimum score of 3.4, from CH400.

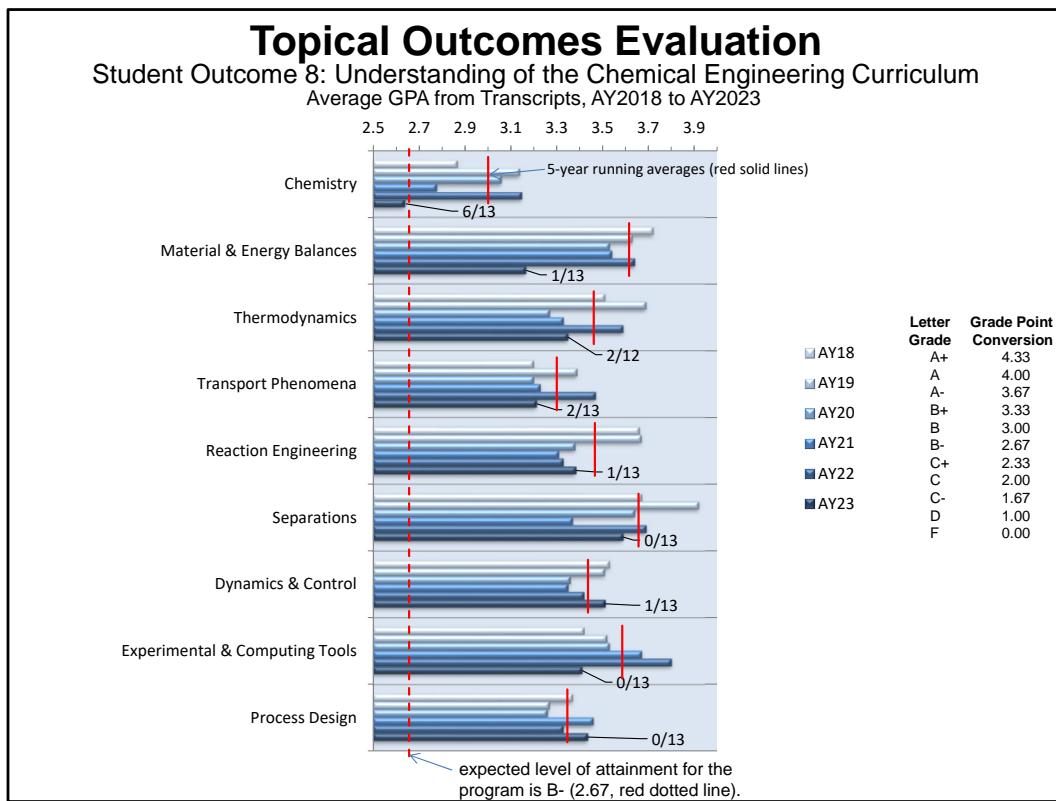


NOTES:

Slide updated 23 January 2024. At the end of each semester, cadets are asked how their courses contributed to the student outcomes (self-perception of their abilities in each ABET 1-7 student outcome). We call this the end-of-semester “student outcomes survey.” Individual data are shown in the program assessment data packets (provided to the faculty and advisory board but not to cadets). To analyze year-to-year trends, this slide shows the yearly averages of the survey results for all outcomes, with each outcome averaged over all courses. Survey results are “normalized” by subtracting survey averages to remove year-to-year bias. The five-year average (5-y avg) is shown for comparison. The chemical engineering courses in the department (cheme) are also shown for comparison. The minimum scores in each outcome are shown by the red dotted line.

The red dotted line represents the minimum score in the survey, (in order, EE301, EE301, EE301, CH383, EE301, and EE301). These courses change year-to-year. In AY22 (one year ago), for example, the minimum scores were dominated by MC300. Prior to 2019, the controls course (XE472) was the lowest course in the survey and was also the minimum in each outcome. The new controls course (CH367, dotted green line), is now significantly higher and near the average for the chemical engineering courses in D/CLS.

The green, yellow, and red bars on the right are meant to mimic a process control indicator, where the 2023 score is the measured process variable (PV) and the 5-year average is our comparison point. For example, in student outcome 7, the 2023 value is very close to the 5-year average 4.19 versus 4.18. In the language of process control, our indicator is “in the green” if we are at or above the 5-year average. The “low alarm” is indicated with “LA” and would trigger some kind of process response. For example, introducing CH367 was a response to low alarm in the process control course (XE472) which was consistent over many years. We are fully “in the green” for AY23, AND THE CADETS ARE DOING VERY WELL by these indicators.

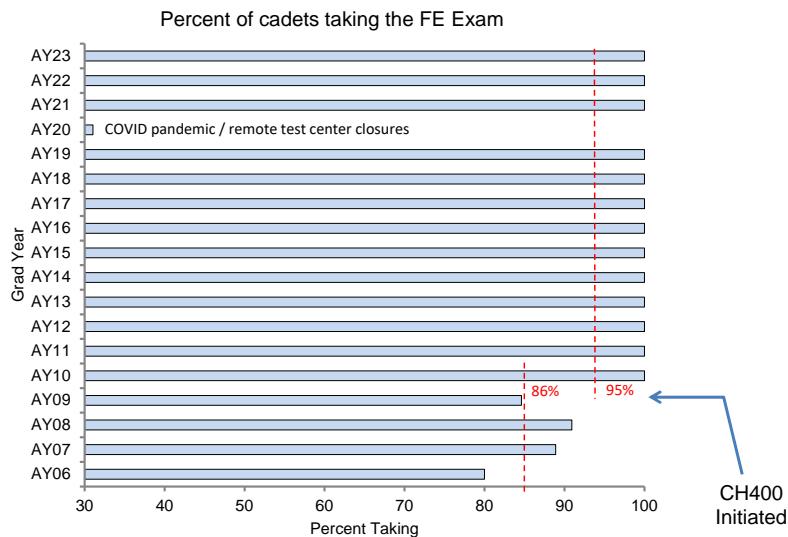


NOTES:

Slide updated 23 January 2024. This slide contains averages of course letter grades in the topic-specific courses obtained from each cadet's final transcript. The averages are shown as a grade point averages (GPA). The GPA scale is 0 to 4.33, as shown in the table to the right. The expected level of attainment in the program is 2.67 (B-, red dotted line), and the 5-year running average for the previous five years is shown as red solid lines. Data labels (e.g. 6/13) are the number of students below B-.

Fundamentals of Engineering Exam

Student Outcome 7: Acquire and apply new knowledge as needed, using appropriate learning strategies



1/23/2024

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NOTES:

Slide updated 23 January 2024. The percentage of cadets taking the exam is associated with willingness to pursue professional licensure and career development and is a marker of recognition of the needs for life-long learning. The drop in AY20 was due to closure of the NCEES test centers during the COVID-19 pandemic.

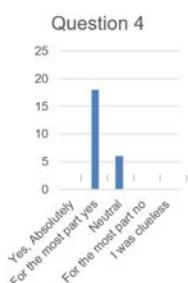
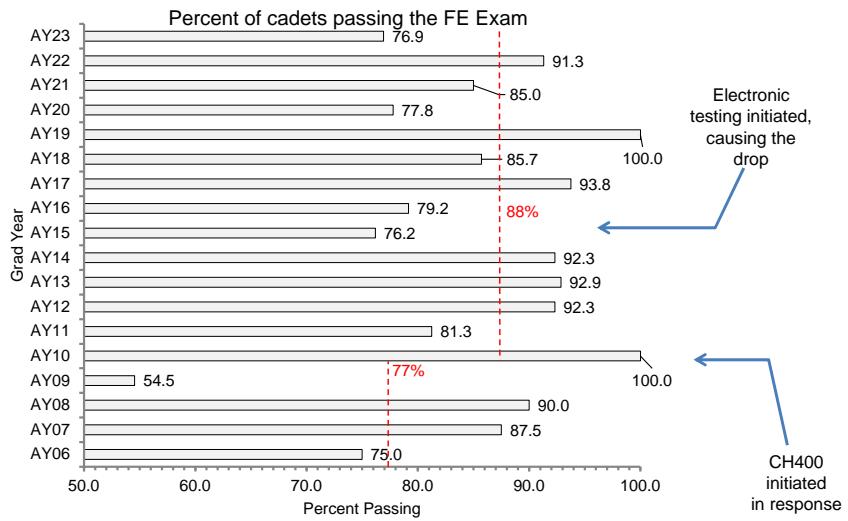
National, (+/- ~1%):

Fundamentals of Engineering Exam

Student Outcome 7: Acquire and apply new knowledge as needed, using appropriate learning strategies

2023	70.2%
2022	70.7%
2021	74.0%
2020	74.6%
2019	77.0%
2018	75.0%
2017	74.0%
2016	79.0%

2015	77.4%
2014	89.0%
2013	86.3%
2012	85.1%
2011	87.0%
2010	87.0%
2009	84.0%
2008	87.0%
2007	87.0%
2006	87.0%

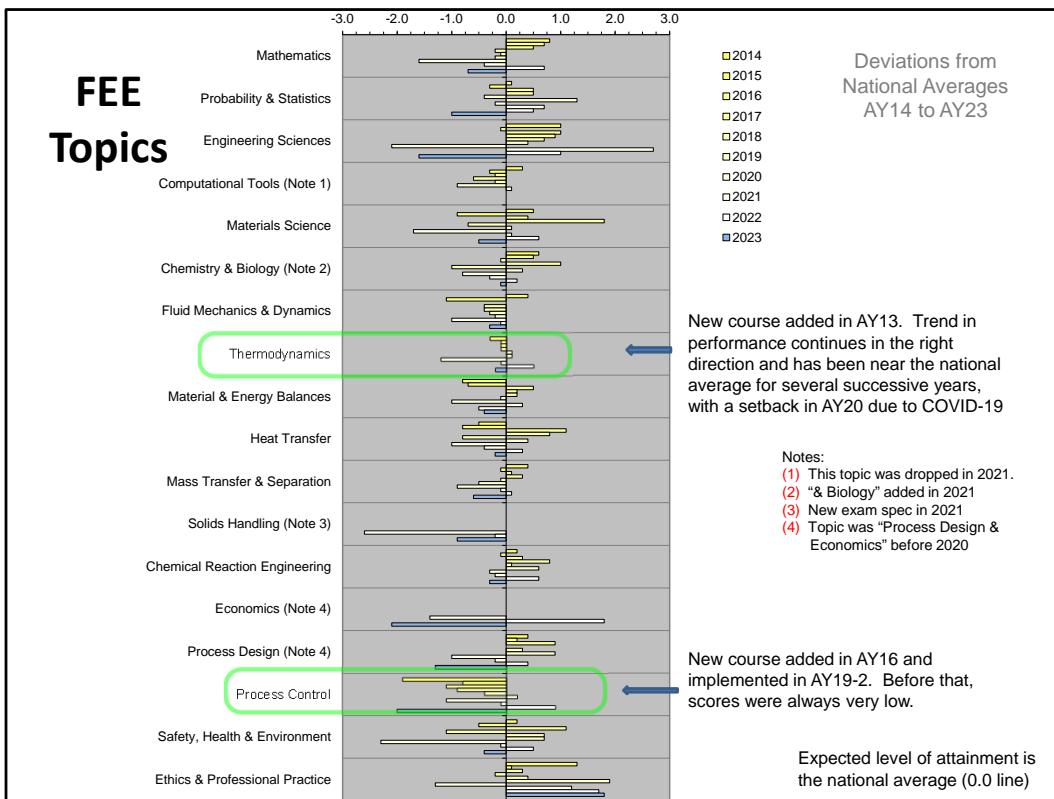


Question 4, Post FEE Survey:
For the questions on the exam
that seemed new to you, were
you able to learn the material
on the spot?

17

NOTES:

Slide updated 23 January 2024. The percentage of cadets passing the FE exam is associated with cadets' ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics. While it is disappointing that some cadets fail the exam, as a group we continue to exceed the national average, indicating VERY STRONG PERFORMANCE as a program.



NOTES:

Slide updated 23 January 2024. The slide shows normalized FEE data, broken down by subject.

Scores are trending upward in Thermodynamics and Process Control. These two are important because they show we are attempting to improve cadet performance on our student outcomes. In the ABET assessment process, we must demonstrate that we are assessing performance and that we are responding to performance indicators. We must also demonstrate that the department is willing to commit resources to the improvement process. These two features form the heart of the ABET process. The addition of these two courses demonstrates our effort to achieve this. We also have documentary evidence to show exactly why we made the changes.

It is important to emphasize that WE ARE NOT REQUIRED TO SHOW IMPROVEMENT. While we are not required to show improvement, we are required to track progress to see if improvement occurs.

Program Objectives

During a career as commissioned officers in the United States Army and beyond, program graduates:

1. Demonstrate effective leadership and chemical engineering expertise.
2. Contribute to the solution of infrastructure and operational problems in a complex operational environment.
3. Succeed in graduate school or advanced study programs.
4. Advance their careers through clear and precise technical communication.

Advisory Board Recommendation + Cadet Approval

1/23/2024

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NOTES:

These are published in Part 2 of the USMA Redbook.

Advisory Board 2023 - 2024

No.	Name	Title	School - Company	Email	Best Dates
1	Kevin Shipe	Automation Engineer	NALCO Champion	kevin.a.shipe@gmail.com	
2	Lucy Hair	EleCent Team Leader	LLNL	hair1@llnl.gov	
3	COL (Ret) Paul Dietrich	Chemical Officer	Chemical Officer/Industry	paul@the-dietrichs.com	7.8 APR; or 21,22 APR
4	Kisondra Waters	Principal Analyst	Margit Analytics	kisondra@gmail.com	14,15 APR preferred; all work
5	Donald Glaser	President	Simulation Solutions	dglaser@simulation-solutions.com	No preference.
6	Matt Garvey	Engineer	Simulation Solutions	mgarvey@simulation-solutions.com	
7	Kelly Schutz	Assistant Professor	Lehigh University	kes513@lehigh.edu	No preference; maybe remote?
8	Lynn Walker	Professor	Carnegie Mellon University	lwalker@andrew.cmu.edu	
9	Matthew Liberatore	Professor	University of Toledo	matthew.liberatore@utoledo.edu	21,22 APR; or 7,8 APR
10	Greg Ritch	COL(RET)/ Engineering Officer	MIL/Industry	garitch@cyzoon.net	
11	Mike Deforest	Industry, Chem E (Old Grad '07)	SMK Packaging	mike@smkpackaging.com	
12	COL Aaron Hill	Academy Professor	USMA; CME	aaron.hill@westpoint.edu	
13	Patrick Underhill	Professor	RPI	underhill@rpi.edu	No preference.
14	Gautham Krishnamoorthy	Professor	UND	gautham.krishnamoorthy@und.com	No preference.

External panel outside visitors representing the various “constituencies” of the program (civilian and military).

Assists with program educational objectives and assessment.

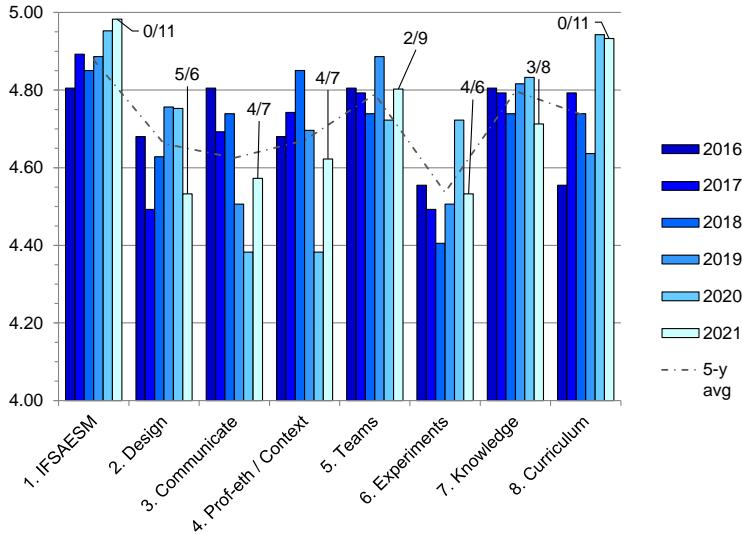
NOTES:

Advisory Board Student Outcomes Surveys

Student Outcomes 1-8

Program Averages from AY16-21

Data labels are response frequencies for 4 or 5 (# of 4s / # of 5s) on the 1-5 Survey Likert Scale
Standard deviations range from .00 to .52



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1/23/2024

NOTES:

Slide updated 9 January 2023. The chemical engineering advisory board is asked to rate performance of cadets on student outcomes, based on data presented to the board at the advisory board meetings. Data for AY2016 to AY2021 is shown here after the most recent advisory board meeting on 7-8 April 2022. Data for AY2022 is not available until after the advisory board meeting in spring of 2023. Data are normalized to compensate for year-to-year fluctuations in the survey average, which places all survey years and board compositions on the same basis. Data labels are response frequencies for 4 or 5 (# of 4s / # of 5s) on the 1-5 survey Likert scale. For example, in outcome 1 IFSAESM, 11 out of 11 board members responded with a 5 and there were no 4's, so the label is 0/11. The five-year average is the dotted line. Relative lows are seen in outcomes 2, 3, and 6.



Engineering
Technology
Accreditation
Commission



Last Visit – 15-19 November 2020

Accredited 1 October 2012 to present

Next Visit – Fall 2026

NOTES:

Questions?

Please make sure you complete all three surveys.

Thank you for your support!

NOTES:

Current Program Educational Objectives (PEOs):

During a career as commissioned officers in the United States Army and beyond, program graduates:

- (1) Demonstrate effective leadership and chemical engineering expertise.
- (2) Contribute to the solution of infrastructure or operational problems in a complex operational environment.
- (3) Succeed in graduate school or other advanced study programs.
- (4) Advance their careers through clear and precise technical communication.

PEOs from ChatGPT:

Query: Write four program educational objectives for the chemical engineering program at the United States Military Academy.

Response:

1. Graduates of the Chemical Engineering program at the United States Military Academy will be proficient in the principles of chemical engineering and be able to apply their knowledge to develop and optimize chemical processes for a wide range of applications in industry and the military.
2. Graduates of the program will be able to analyze complex problems and apply critical thinking skills to develop effective solutions. They will be able to work collaboratively with others to achieve common goals and communicate their findings effectively to technical and non-technical audiences.
3. Graduates of the program will possess a strong foundation in ethics and be committed to upholding the highest standards of professional conduct in all their endeavors. They will demonstrate a commitment to serving the Army and the nation with honor, integrity, and dedication.
4. Graduates of the program will be well-prepared to continue their education and professional development throughout their careers, staying abreast of new developments in the field and adapting to changing technological, societal, and environmental challenges. They will be leaders in their communities, contributing to the advancement of the chemical engineering field and making a positive impact on the world around them.

Query: Write four concise program educational objectives for the chemical engineering program at the United States Military Academy five to seven years after graduation.

Response:

1. Graduates will have demonstrated their ability to apply the principles of chemical engineering to real-world problems, making significant contributions to the Army and/or industry.
2. Graduates will have developed strong leadership skills, taking on roles of increasing responsibility in their organizations and making a positive impact on their communities.
3. Graduates will continue to engage in lifelong learning, keeping abreast of new developments in the field and adapting to changing technological, societal, and environmental challenges.
4. Graduates will act with integrity and ethical responsibility in all their professional endeavors, upholding the highest standards of professional conduct and making decisions that reflect a commitment to service and the greater good.

Chemical Engineering graduates of the United States Military Academy demonstrate effective leadership and expertise for future military and industrial applications.



* Research

Walter Cesarski,
Tristan Weaver
Mason Gault
Michael Sullivan

#1

Objective 2:

Alisan B., Vesa I., Abby M.

Graduates of the program will be able to solve problems in a complex operational environment through application of critical thinking and collaborative work.

* NO "infrastructure" because it takes away from us being Chem E's rather than mech E's or Civil engineers

P

Graduates of the program seek to engage in lifelong learning to contribute and excel in graduate school or other advanced study programs, in and out of the Army.

#3; Brady, Sean, Anney

(2)

Graduates of the program seek to engage in lifelong learning to contribute and excel in further advanced study programs or graduate school, in and out of the Army.

#3; Brady, Stan, Avery

③

- graduates of the program seek to engage in lifelong learning to contribute and excel in further advanced study programs, in and out of the Army.

#3; Brady, Scan, Avery

#4

USMA graduates will be leaders in their profession, both militarily & ethically. The continuation of personal & professional education will ensure a strategic mindset w/ the capability to communicate on a technological level.

Benson

Cianfaglione

Cotterin

Mossman

Mike Williams + Summer Bennett

- (1) Demonstrate proficiency in Chemical engineering concepts and apply critical thinking to leadership dilemmas
- (2) Contribute to a diverse, multi-disciplinary team to solve complex technical problems

Excel in various engineering disciplines, in or out, of graduate school or other advanced study programs following graduation.

Caleb Johnson

Max Onaga

Caleb Johnson

Max Onager

4. Communicates Objectives & goals
using engineering expertise to
lead and/or magnify team
environments.