

# Chemical Engineering (CEN1) Standard Operating Procedures (SOP) and DAC Notes, AY2020

## I. Chemical Engineering Department Academic Counselors (DAC) Standard Operating Procedures (SOP)

This document outlines the responsibilities and expectations for DACs within the Chemical Engineering (CEN1) major. The DAC Notes portion describes recurring questions cadets ask of their DACs, as well as situations DACs need to be alert for within the Academy Management System (AMS). Although many of these issues show up during a Degree Audit or Grad Check, they are explained in more detail here.

### A. CEN1 DAC Responsibilities

DACs will be familiar with Figure 8 in the Notes section so that at any time that an interested cadet asks, they can discuss the general requirements for the major. DACs will also have a durable hard-copy of the 8TAP available in their office for discussion.

To become a DAC, faculty need to request access to the “ADVISOR” app within the AMS system. This is accomplished through the AMS Applications and Modules function on the AMS homepage (Figure 1).

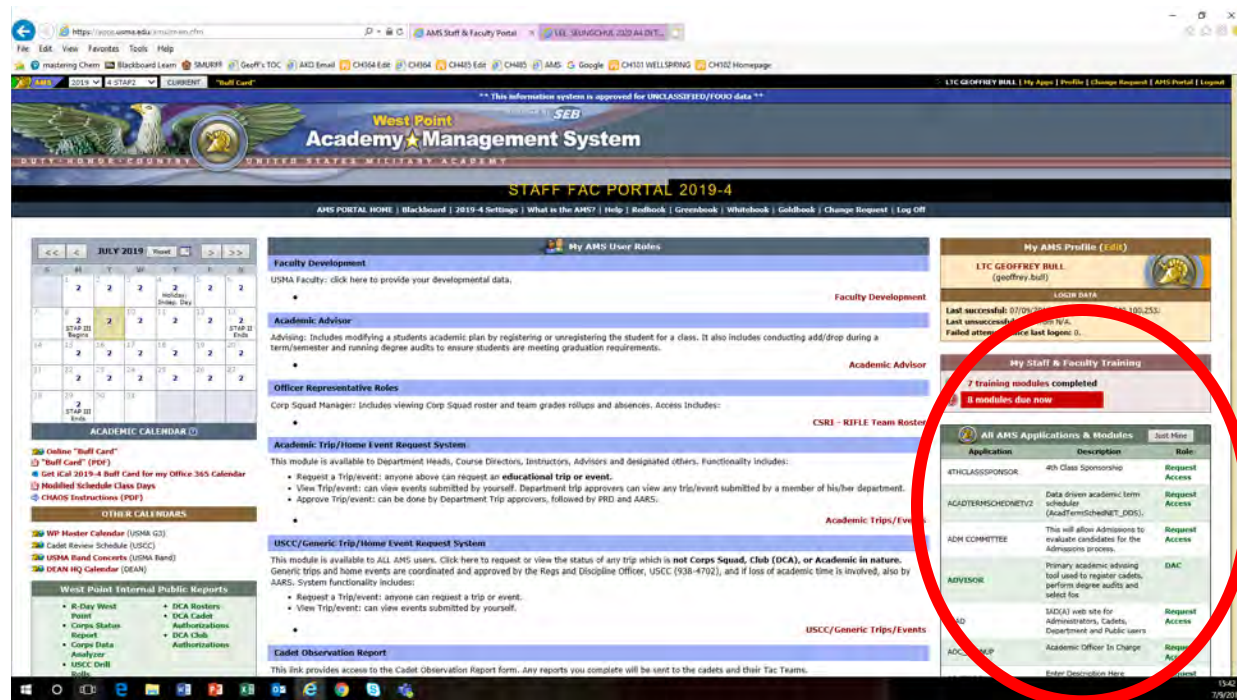


Figure 1. AMS Homepage with highlighted Applications section.

Once requested, access is usually granted within 24 hours. When access is granted, an Advisor can now sign cadets up for the major.

During the spring semester of their 4<sup>th</sup> Class (Plebe) year, prior to Spring Break, cadets will declare their major. Any DAC can sign up a major. However, any cadet with a 2.7 QPA or below from their first semester must be directed to the program director for direct counseling

prior to being signed up for CEN1. By default, the faculty member who signs the cadet up automatically becomes their DAC.

Upon completion of the sign-up period, the program director or a designated faculty member, will assign permanent DACs to the new majors, distributing the new majors across the available DACs. If a faculty member particularly wants to advise a specific cadet, this can be requested at any time.

**NOTE: Any time an action is taken or discussion is held (in person or electronically) between a DAC and cadet, an annotation of the action/discussion should be made in the “Advisor Remarks” in AMS.**

The first hard requirement for DACs is to meet (in-person is preferred, but documented email conversations can be sufficient) with their new majors prior to the Friday of Week 13 of the semester (middle of April) and go over the cadet’s 8TAP. A synopsis of this meeting **MUST** be documented in the “Advisor Remarks” section of the 8TAP page (see Figure 2).

First priority for each cadet is to identify any “Graduation Check Deficiencies.” These will show up automatically when the 8TAP button at the top of the screen is clicked. An example is shown in Figure 2. The notes section describes many of the common fixes to deficiencies. The major exception is a cadet not having chosen their engineering electives. Resolution of this deficiency is described later.

**Academic Plan**

(Major-related courses are in blue)  
Click on Major-related language courses to change course tag to CORE.  
{n} denotes term course count for total academic classes having 3 or more credit hours

2019-1	2019-2	2020-0	2020-1	2020-2	2021-1	2021-2	2022-1	2022-2
(7)	(8)	(1)	(7)	(6)	(8)	(5)	(5)	(3)
EN101	EN102	ML100	CH102	CH362	CH363	CH364	CH365	CH400
HI105	HI108R		LR203	EV203	CH383	CH367	CH459	CH402
IT105	MA255		MS200	LR204	EE301	MC300	CH485	MX400
MA153	MD102		PE215	MA206	HI302	MC312	LW403	
MD101	MS100		PY201	MA364	MC311	SS307	PE430	
PE117	PE116		SS201	PE322	MS300			
PH255	PH256		SS202		PE360			
	PL100				PL300			
{5}	{5}	{0}	{5}	{5}	{6}	{5}	{4}	{2}
7	8	1	7	6	8	5	5	3

**Graduation Check Deficiencies**

CADET UNDERLOADED:(18)  
COURSE COUNT FOR 2022 1 = 4  
COURSE COUNT FOR 2022 2 = 2  
COURSE COUNT FAILED:(15)  
37 COURSES FOUND  
FOS/MAJ TOTAL COUNT NOT SATISFIED:(24)  
HAS 18 OUT OF 19 Courses Required for Graduation  
FOS/MAJ DIRECTED TRACK NOT SATISFIED:(20) [CEN1 details](#)  
Track Number: 2 Electives 0 out of 3 [register](#) | [waiver](#) (Note: request major course substitution waiver)  
PRE REQUISITE FAILED FOR COURSE (9)  
MA364 [course details](#)

[Request Waiver](#) (Note: request any/all waivers)

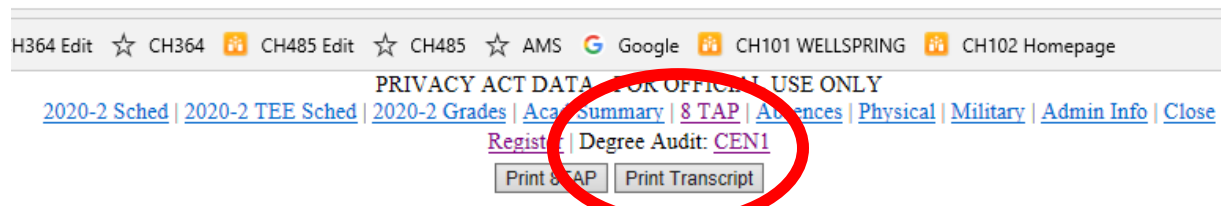
**Graduation Checks Satisfied**

**Advisor Remarks** [Click here to Edit](#)

0 Remarks Found

**Figure 2.** Example 8TAP highlighting Grad Check deficiencies and Advisor Remarks sections.

Second priority is to run a “Degree Audit.” This button is found near the top of the 8TAP screen (Figure 3).



**Figure 3.** Example 8TAP screen highlighting the Degree Audit function.

The Degree Audit shows ALL courses that a cadet is required to take within the given major, in this case, Chemical Engineering (CEN1). These are broken down into various categories (which are not of immediate importance but can be discussed if you want the background). If the courses are in a cadet's 8TAP, there will be a green **Y** in that category. If they have not been met, a red **N** will be present (Figure 4). This is your overall indication that a cadet's 8TAP does or does not meet the requirements for the major.

[Degree Audit Course Edit](#) | [Close](#)

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**DEGREE AUDIT  
FOR  
CDT DUFFY, BRIGIT A - USMA ID: C45958087 - CLASS: 2020**  
Date: 07/10/2019 - Time: 10:41:25AM

[Refresh Page](#)

View Options:  [\\*Default Mode\\*](#)

[Export to Excel](#)

MAJOR	TRACK	MAJ CRSE	MAJ CRSE TITLE	SATISFIED?	CMPLTD CRSE	SBST CRSE	ACAD YR	TERM
CEN1	Required Courses (12 of 12)			Y				
		1 CH362	MASS & ENERGY BALANCES		CH362		2018	2
		2 CH363	SEPARATION PROCESSES		CH363		2019	1
		3 CH364	CHEMICAL REACTION ENGINEERING		CH364		2019	2
		4 CH365	CHEMICAL ENG THERMODYNAMICS		CH365		2020	1
		5 CH367	INTRO / AUTOMATIC PROC CONTROL		CH367		2019	2
		6 CH383	ORGANIC CHEMISTRY I		CH383		2019	1
		7 CH400	CHEM ENG PROFESSIONAL PRACTICE		CH400		2020	2
		8 CH459	CHEM ENGR LABORATORY		CH459		2020	1
		9 CH485	HEAT AND MASS TRANSFER		CH485		2020	1
		10 MC300	FUND OF ENGR MECH AND DESIGN		MC300		2018	1
		11 MC311	THERMAL-FLUID SYSTEMS I		MC311		2019	1
		12 MC312	THERMAL-FLUID SYSTEMS II		MC312		2019	2
	Electives (3 of 17)			N				
		1 EE360	DIGITAL LOGIC W/ EMBEDDED SYS		EE360	ME201	2018	1
		2 MC380	ENGINEERING MATERIALS		MC380		2020	1
	Complementary Support Courses (3 of 5)			Y				
		1 EE301	FUNDAMENTALS OF ELEC ENGIN		EE301		2018	2
		2 MA365	ADV MATH FOR ENGRS/SCIENTISTS		MA365		2019	1
		3 PH256	ADVANCED PHYSICS II		PH256		2018	1
	Integrative Experience for the Major (1 of 1)			Y				
		1 CH402	CHEM ENG PROCESS DESIGN		CH402		2020	2
	Science Depth (0 of 0)			Y				
		1 CH102	GENERAL CHEMISTRY II		CH102		2018	1
	STEM Depth (0 of 0)			Y				
		1 MA255	ADV MULTIVARIABLE CALCULUS		MA255		2017	2
	IT/CYBER Requirement (0 of 0)			Y				
		1 CH367	INTRO / AUTOMATIC PROC CONTROL		CH367		2019	2
		2 EE301	FUNDAMENTALS OF ELEC ENGIN		EE301		2018	2
	Writing-in-the-Major (0 of 0)			Y				
		1 MC312	THERMAL-FLUID SYSTEMS II		MC312		2019	2

**Figure 4.** Example Degree Audit screen showing an incomplete 8TAP with a red “N.”

The most common issue is that cadets have not picked and enrolled in their required 3 engineering courses outside the major. This discussion needs to be part of the initial counseling a cadet receives once they have declared the major. While cadets do not need to pick their engineering electives immediately, the earlier they choose them, the more flexible their 8TAP can potentially be. Electives can also be changed during normal “Open Enrollment” periods.

AT A MINIMUM, the Degree Audit function will be run once per semester during the week prior to open enrollment ending (usually week 13 – mid-April in the Spring, mid-November in the Fall). This run and any reported discrepancies will be recorded in the Advisor Notes section. An example is shown in Figure 5.

Advisor Remarks ([Click here to Edit](#))

REMARKS	
Degree Audit failed, needs another engineering elective. Also overloaded in 20-1; req out-of-cycle change to move MX400 to 20-2 to meet co-req. Emailed cadet about elective.	
Submitted By: LTC BULL (MADN-CHEM)	Date: 07/10/2019
Cadet desires to take more Arabic classes. Moved PE360 to pair with LTS in 19-2 and moved SS202 into 19-1 to accommodate this request. She may have to take an alternate lab to deconflict.	
Submitted By: DR LACHANCE (MADN-ORD)	Date: 05/02/2018

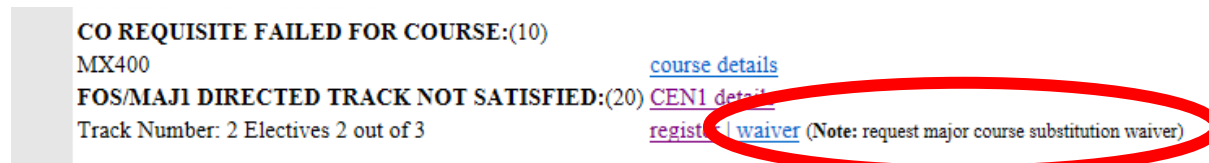
**Figure 5.** Example Advisor Notes indicating 8TAP deficiencies and actions taken by the DAC to resolve.

## B. Waiver requests.

Waiver requests can be submitted for a number of reasons, including “Pre-Requisite,” “Co-Requisite,” and “FOS CRSE Substitution,” among others. These three are the most common within the Chemical Engineering major and of these, the FOS CRSE Substitution is by far the most common. Cadets often would like to take a course that has Engineering Topics (ET) credit that is not one of the “Templated” or “Pre-Approved” engineering electives that the AMS system has for the CEN1 major. This can happen because of new courses being added or just low-enrollment courses that our majors don’t usually take. The Chemical Engineering Program Director is the approval authority for any waiver request for Chemical Engineering majors.

The procedures for submitting a Course Substitution Waiver are as follows:

- 1: Identify which course your cadet would like to take.
- 2: Verify in the Redbook that the course meets the ET requirements (3.0) for the major.
- 3: Confirm with the Program Director that this course would be an acceptable engineering elective.
- 4: Enroll the cadet in the requested course, in the appropriate term, so that it appears on the 8TAP.
- 5: In the AMS 8TAP screen for the cadet, click the “waiver” link next to the “(Note: request major course substitution waiver)” description (Figure 6).



**Figure 6.** AMS 8TAP screen highlighting the waiver function.

6: In the next screen (Figure 7), you will see the newly enrolled course on the right-hand side of the screen. Select the requested course in this box.

7: The smaller box on the left lists all of the APPROVED engineering courses. Select ANY of the courses in this box that the cadet is NOT enrolled in. This is the “Replacement” course.

8: In the “Remarks” section, be explicit in the terminology. In the example of Figure 7, this would be: “Request CH489 be substituted for EE377 to meet the engineering elective requirement. CH489 has 3.0 ET. Program Director approves.” Note: there is a 255-character limit to the Remarks section, so be concise.

9: Click the “Issue” button.

Cadet Details

**FOS/MAJ Waiver Request**  
**Deficiency Electives 2 out of 3**  
**Deficiency Reason: 20**  
**For: CDT DUFFY, BRIGIT Class 2020**  
**Company H3**

**Waiver Type: FOS CRSE SUBSTITUTION (Code = 5)**

**FOS/MAJ Track Course List Replacement Course Number**

FOS/MAJ Track Course List	Replacement Course Number
EE377	2020 1 CH485
EM411	2020 1 CH489
EM420	2020 1 CH489
EM481	2020 1 CH489
MC306	2020 1 LA475
	2020 1 MC380
	2020 1 MC380
	2020 1 MX400
	2020 2 CH400
	2020 2 CH402
	2020 2 CH402

**Remarks**

Request CH489 be substituted for EE377 to meet the engineering elective requirement. CH489 has 3.0 ET. Program Director Approves.

Reset Issue

**Figure 7.** AMS Waiver Request example for course substitution.

10. The waiver will now be submitted in AMS. Inform the Program Director via email or in person that the waiver request has been submitted. The Program Director will approve the waiver via a note under Advisor Remarks for the cadet. This will log the date and time under the Program Director’s name.

11. Once the Program Director has approved the waiver in AMS, the Head DAC will issue an approval in AMS. The new course will become visible in the Degree Audit screen as one of the electives in the major.

Pending and Approved waivers are visible in AMS. However, still make note of the waiver request in the Advisor Notes.



## II. CEN1 DAC Notes

Figure 8 is the Chemical Engineering major (CEN1) template 8TAP that should have been dropped in AMS when cadets declare their major. Unfortunately, sometimes the template does not work well and quite a few of our cadets will need some immediate attention.

4th Class Year		3rd Class Year		2nd Class Year		1st Class Year	
Fall Term	Spring Term	Fall Term	Spring Term	Fall Term	Spring Term	Fall Term	Spring Term
CH101	CH102	DFL1	CH362	CH363	CH364	CH365	CH400
EN101	EN102	MA205	EV203	CH383*	CH367	CH459	CH402
HI105	HI108	PH205	DFL 2	EE301	MC300*	CH485	Eng. Elective*
IT105	MA104	PY201	MA364/5	MC311	MC312	Eng. Elective*	LW403
MA103	PL100	SS201	PH206	MA206	SS307	Eng. Elective*	HI302
			SS202	PL300			MX400
{5}	{5}	{5}	{6}	{6}	{5}	{5}	{5}
17.0	17.5	23.0	20.5	17.0	16.0	16.5	17.0
Can be taken either semester of the indicated year		CEN1 Exception to Policy -Flexible		CEN1 major courses – generally MUST be taken in the indicated semester *most flexible courses			

**Figure 8.** Standard CEN1 8TAP.

The highlighted blue rows show the total number of academic courses and credit hours (respectively) taken each semester. They obviously are not balanced and when validations and potential research credits are accounted for, this template will not serve our majors well in all cases. The notes below indicate the limits within which DACs should operate when advising class of 2021 and beyond cadets.

### **A. Overall:**

Validations and research aside, CEN1 cadets should have 2 semesters with 6 courses and 6 semesters with 5 courses. Except in cases requiring program director approval (e.g., double majors), all CEN1 majors will have at least 52.0 credits of engineering (ET).

Make routine use of the Degree Audit feature in AMS. This feature generally catches things like pre/co-requisite failures. Sometimes there are 'issues' that really aren't, but the system hasn't been alerted to them. For example, it may give an error for MA205 prerequisite for CH362 but the cadet took MA255 (advanced version). If you get this sort of error, just let the program Head DAC (LTC Bull for AY2020) know, or contact the Registrar's office directly. POC in Registrar's office: Mr. Bob Gosicki (global).

Make generous use of Advisor Notes feature in AMS. Any changes, request, etc., need to be documented. **Per the SOP, at a minimum, each cadet should have one note per semester, indicating Degree Audit was run.**

### **B. Constraints:**

CH102 and MA205 must be taken NLT fall term 3<sup>rd</sup> class year (program director approval for spring term)

MA206 can be taken first semester 2<sup>nd</sup> class year.

CH362, MA364, CH363, CH364, CH459, C365, CH485, CH400, CH402 must remain in their respective semesters as listed.

CH383, MC311, MC312 can be moved forward (earlier) but not later.

DFL1, DFL2, PY201, SS201 (economics), SS202 (American Politics) remain in 3<sup>rd</sup> class year (unless taken earlier; can be either semester).

PL300 and SS307 remain in 2<sup>nd</sup> class year (can be either semester).

LW403 remains in 1<sup>st</sup> class year (either semester).

HI302 is (as of AY2019) a co-requisite for MX400. MX400 can no longer be taken first semester Firstie year if HI302 is in the second semester.

### **C. Branches**

The "Jedi Math" track involves cadets usually validating MA104. This involves MA153, MA255, and then MA365 in lieu of MA364. For cadets that ask, the bulk (75-80%) of MA364 is covered in MA153/255. As a result, the remaining 20-25% is still covered in MA365, but additional topics, such as some linear algebra, are covered, to avoid 1) double teaching content and 2) cadets getting bored.

### **D. Flexibility**

HI302 can be taken 1<sup>st</sup> class year (either semester); this will happen often.

MA206 can be taken 2<sup>nd</sup> class year (usually fall term; program director approval for spring term).

Engineering electives can be taken any semester. For the most part, engineering electives can be any course with 3.0 or more engineering credits (ET), but require program director approval if a degree audit does not recognize them.

SS201 (Economics) may be moved to fall term 2<sup>nd</sup> class year with program director approval (not common).

MC300 can be moved forward or as late as first semester 1<sup>st</sup> class year.

### **E. STAP**

Voluntary STAP has become much more 'acceptable' in recent years and is a way that cadets can free up time in their schedules for other courses (e.g., SAP/SAEP, med school option). Generally, these are core courses, and cadets have to make sure that they are meeting summer graduation requirements on the Comm's side (Buckner, CLDT, CTLT, military IAD, etc.). Commonly available STAP courses are: MA206, PL300, sometimes SS201, SS202, or SS307, and sometimes HI302 (not common).

### **F. Additional courses**

Many chemical engineering cadets will validate one or more courses. Because validations now count as credit hours received for accreditation purposes (Redbook, Part 1 "The Academic Program"), the validation of more than 2 courses will require the selection of electives beyond the three required engineering electives. While no constraints are ultimately placed on these electives once cadets have met the requirements of the major, some courses of action are preferred to others. Until such time as we have true chemical engineering electives, guidance follows:

1) If GPA is appropriate (generally > ~3.3-ish, and definitely if they meet the criteria for the honors major), try to guide toward one or more semesters of 3.0 credits of research (CH489/490/491/492).

2) Recent classes (and some advisory board members) have pushed for adding the second semester of organic chemistry, CH384. If the cadet is willing, go for it but it should really be added in during the semester immediately following the one in which they take CH383. This may result in scheduling issues.

3) Collectively, our (and most) cadets struggle with fundamental engineering math skills. In the past, the Linear Algebra (MA371) has been worthwhile. Most classes involving differential equations are probably worthy electives. Other complementary courses are MA391, MA396, CH481/2.

4) Other chemistry courses that have long-term benefits for chemical engineers: Introduction to Analytical Chemistry (CH371) and Polymer Chemistry (CH471) are both recommended. Any other basic chemistry (P. Chem, Inorganic, etc.) could all be acceptable. These are all time-intensive lab courses.

5) Again, ultimately, cadets could take additional language, they could choose a minor, history courses. Encourage them to have a goal toward which this elective will help them.



## **G. Semester Abroad Program (SAP) / Service Academy Exchange Program (SAEP)**

We continue to get routine requests for either SAP or academy exchange among our majors. The overarching limitation is that we only offer our chemical engineering mandatory courses each in a single semester. As a result, the cadet **MUST** attend a school that offers an accredited chemical engineering program or take one of our courses via distance learning.

As a program, we are currently offering only CH363 in a 'distance learning' format during the fall semester of their 2<sup>nd</sup> Class (junior) year. That format basically requires cadets to learn much of the material on their own via the textbook. Once a week, they and the instructor will link up in some fashion for specific face-to-face questions, etc. Very often, they are back at USMA in time for the TEE, which they will take, either before the winter break or during the spring semester Reorgy Week.

The same semester, Fall of 2<sup>nd</sup> class year, cadets will have to take MC311 via distance. CME offers this routinely.

As a result, the usual hurdle is Organic Chemistry. Many abroad universities offer a version of Orgo I, but often without the lab portion (which they sometimes take the next semester). Cadets' best bet for SAP/SAEP is if they take CH383 as yearlings. This is a topic that cadets need to broach with DACs ASAP. If questions, check with experienced DACs.

## **H. Medical School Option**

Generally we get 1 or 2 ChemEs that at least query about the possibility of also doing medical school. A couple of standard responses:

First, try to have this conversation with cadets that express interest at the time of their signing up for the major. Generally, approach it from the perspective of what their long-term goals are. The two semi-standard cadet responses are: (1) I definitely want to go to medical school or (2) I want to be an engineer, but I want to hedge my bets.

In case 1), general guidance is that it would serve them best to be part of the program that would set them up best for medical school in the long run. Generally speaking, that is going to be the life science major. However, this does not guarantee them a medical school spot (only about half or less of Life Science majors end up going to graduate school). Absent medical school, an engineering degree is far more valuable than life science in terms of job prospects. If they express such interest as 'bio-engineering' or some other engineering based long-term goal, the engineering degree is also more appropriate. If they acknowledge and understand these ideas, then case (2).

In case (2), it can be a challenge to get the schedule to work out. However, there are some general guidelines and discussion points below.

If they don't have at least 2 validations, it's going to be VERY difficult. If they haven't taken CH102 in the spring of plebe year, probably impossible; they really need to take Orgo 1 and 2 (CH383/384) in yearling year. The other courses they need to take (mandatory) are: CH375 Advanced Biology (although CH275 is now acceptable, I think, since they are disqualifiers of each other); CH387 Human Physiology; and CH473 Biochemistry. All of these need to be taken by Spring of their Cow year so that they have them on their transcripts during the medical

school application process, which begins that semester. They also need them for taking the MCAT, generally June after their Cow year.

The cadets need to get linked in with the Pre-Medical Club organized by the Life Science major. Some other Med School notes, that should be discussed in the pre-med club meetings, but probably need to be highlighted are:

Medical schools apparently like to see research on the transcript. This does not have to be medical or bio related, but just some research. Generally, recommend having a 400-level research course on the books prior to the application period (i.e., by spring of Cow year).

They need to have some sort of 'physician shadowing' experience on their resume. This does not have to be via an AIAD or anything formal, they just need to demonstrate that they have had some pretty in-depth interactions with a physician, preferably more than one, to show they are serious about this process. This is of concern, not so much for the medical school application, but to get them past the internal West Point vetting process.

The Dean's Office POC for medical school matters is Dr. Al Beitler, x6328. Very nice guy who will call a spade a spade.