CEE 407 – Aviation Design

Fall 2025 Course Syllabus

Instructor: Kevin Spitz, P.E.

Class Hours: M 9:00 AM-10:20 In-Person / W 9:00 AM-10:20 Remote

Office Hours: Mondays 10:30 AM – 12:00 PM 2209 Newmark Civil Engineering Building

Course Purpose:

Airports are both the gateway and welcome mat to our communities. While each airport is unique, their design is based upon a set of rules and guidelines that stress safety, security, and operational efficiency. We will look at the many pieces of our national aviation system and airports and how they interface with more traditional civil engineering design elements. We will also discuss airports and air travel's role in sustainability and how airports integrate into our communities.

Course Objectives

- **Airport Planning**: Understand the role that data collection and analysis play as it regards master planning, airport layout plans, and environmental review.
- **Airport Design**: Implement the elements of the airport into a student led design based on the FAA's guidance and Advisory Circulars.
- **Airport Operations:** Analyze the different elements of the national aviation system including different airspace, surfaces, and safety areas on the airport. This includes gaining an appreciation for special safety and security concerns as it relates to airports.
- **Airport Administration:** Gain an appreciation for the role airports play in our community, how they are funded, and how policy is set.
- **Future of Airports:** Choose a topic of interest/concern regarding airport or air system infrastructure and apply concepts learned in class to discuss potential solution to an industry issue.

Required Reading Materials

AAAE CM Modules Book

Schedule

Week 1

Monday August 25 - Introduction to Public Aviation **In-Person**

Wednesday August 27 - Introduction to Aviation Design **Remote**

Reading: AAAE C.M Module 1 – Pg 12 – Pg 49

AAAE C.M Module 2 – Pg 32 – Pg 62

Participation Grade: Introduce Yourself: Due Tuesday 9/2 5:00 AM

Homework 1: Grant Assurances: Due Monday 9/8 5:00 AM

Week 2

Wednesday September 3- Introduction to Geometric Design 1 – The Runway **Remote**

Reading AAAE C.M Module 1 – Pg 49 -95

Homework 2: Designing a Runway, Due Monday 9/15 5:00 AM

Week 3

Monday September 8 - The FAA and Regulation with Aviation **In-Person**

Wednesday September 10 - Introduction to Geometric Design 2 – The Airfield **Remote**

Reading AAAE C.M Module 1 – Pg 95 -137

Extra Credit Homework: (15 points) Designing a Taxiway Fillet in AutoCad, Due Monday 9/22 5:00 AM

Week 4

Monday September 15- FAA Airspace and Airport Surfaces and Grading -1 **In-Person**

Wednesday September 17- FAA Airspace and Airport Surfaces and Grading -2 |Introduction to Graduate Project, **Remote**

Reading AAAE C.M Module 2 – Pg 6 – Pg 32

Participation Grade: Airport Planning & Markings, Signs, and Lights, Due Monday 9/29 5:00 AM

Week 5

Monday September 22- Master Planning & Career Presentation (Aviation Planner)| **In-Person**

Wednesday September 24- Airport Layout Plans **Remote**

Reading AAAE C.M Module 3 – Pg 6 – Pg 32

Homework 3: Planning an Airport Due Monday October 6 5:00 AM

Week 6

Monday September 29- Airport Signs, Markings, and Lights-1 **Remote**

Wednesday October 1- Airport Signs, Markings, and Lights-2 **Remote**

Homework 4: Capulet Airport – A Case Study, Due Monday October 13 5:00 AM

Week 7

Monday October 6- Airfield Safety Design – 1 **In-Person**

Wednesday October 8- Airport Navigational Aids **Remote**

Reading AAAE C.M Module 4 – Pg 80-113

Mid Term Exam 1 -Remote – Through Lecture Week 6 (Airport Planning) Due Monday October 20 5:00 AM

Week 8

Monday October 13 – Airfield Safety Design -2 **In-Person**

Wednesday October 15 – Airport Pavements Design (AP-Tech Guest Speaker) **In-Person**

Reading - Read AIP Handbook Chapter 3 Change 1 to FAA Order 5100.38D, Airport Improvement Program Handbook, 26 February 2019

Homework 5 – Aviation Safety Design and Pavement Design Due Monday October 27 5:00 AM

Week 9

Monday October 20- Field Trip: CMI for Tour + Career Presentation (Airport Management) **In-Person**

Wednesday October 22 – Introduction of Final Project | Career Presentation (State Agency – IDOA) **Remote**

Reading AAAE C.M Module 3 – Pg 6-56

No Homework

Week 10

Monday October 27 – Futurization Presentations **In-Person**

Wednesday October 29 – Futurization Presentations **In-Person**

Reading **AAAE C.M Module 2 – Pg 62-90**

AAAE C.M Module 3 – Pg 56-101

Homework 6 – A Case Study in Landing Guidance at Pridelands Airport Due Monday November 10 5:00 AM

Week 11

Monday November 3 - Commercial Service Airports, Safety, & Security **In-Person**

Wednesday November 5 – Capacity Analysis and Airport Terminal Design | | Career Presentation (Airlines) **Remote**

Reading **AAAE C.M Module 4 – Airport Noise Abatement Pg 49-80**

Homework 7 – Law County Airport Snow and Ice Control Prioritization & ARFF Plan Due Monday November 17 5:00 AM

Week 12

Monday November 10 – Airport Operations (Phasing Plans) – Hub Airport Capital Projects **In-Person**

Wednesday November 12 – Aviation Noise Compliance **Remote**

AAAE C.M Module 2 – Pg 90-112

AAAE C.M. Module 4 - Pg 5-61

Homework 8 – Pond Mountain Phasing Plans and Noise Compliance - Due Monday December 1 5:00 AM

Week 13

Monday November 17 – Introduction to Environmental and Sustainability in Aviation **In-Person**

Wednesday November 19 Airport Marketing | Air Service Development and Network Route Planning(Career Presentation) **Remote**

No Reading

No Homework

Week 14

Monday December 1- Airport Pavement Construction Maintenance (Charley Greer) – **In-Person**

Wednesday December 3 - Heliports / Commercial Space/ EVTOL | Career Presentation (Military Airport Design) – **Remote**

Mid Term Exam 2 - Remote – Through Material Week 13

Module 2 Page 62 Through Module 4 Due Monday December 8th 5:00 AM

No Homework

Week 15

Monday December 8 - Engineering Report Presentation **In-Person**

Wednesday December 10 - Engineering Report Presentation **In-Person**

CEE 407 – Grading

- Class Participation 100 Points
- Design/Planning Assignments 25 Pts Each * 8
- Two Mid-Term Exams 200 Pts Each * 2
- Engineering Report 500 Points
- Total 1200 Points

- Graduate Project - (Futurization of Airports Report/Presentations) …….400 Points

Course Grade:

Grades	
93% +	A
90-93	A-

87-90	B+
83-87	B
80-83	B-
77-80	C+
73-77	C
70-73	C-
67-70	D+
63-67	D
60-63	D-
< 60	F

Participation

The airport environment has many very interesting topics that are worthy of class discussion. The expectation is that students will show up at class and will participate in discussion. There will be 10 – 10-point grades given for participation. At different times participation will be graded in different ways:

- Attendance
- Completion of out-of-class assignments
- Presentations in class
- Participating in debate in Class
- Peer grading
- Providing written opinions on speakers

There **may or may not** be advanced notice *in class* when these participation grades may be assigned and due. For those who are remote students or asynchronous students, that will be taken into consideration.

Design/Planning Assignments

As described in the schedule above, students will be expected to complete homework assignments to apply the lessons learned in class or to prepare for a lecture. Unless otherwise specified, homework for the week will be due Monday at 5:00 AM the following week.

For Example, Week 2 Homework assigned Wednesday September 3 will be due by Monday September 8th

Late homework will be graded at my discretion with a 50% deduction for the first instance. The second instance will be worth 0 points. Homework typically involves thinking through a case study or creating individual class materials. If a page limit is given students MUST abide by the page limit.

Mid-Term Exams

Mid-term exams will be a mixture of multiple-choice questions, and problem statements based on the lectures, homework, and readings. I reserve the right that **anything in the reading *may* be included on the exam.** Students will have a maximum of 2-hours to complete the exam outside of class and will be given a due date the exam must be taken by. Both will be an open-book exam. Working in teams will not be allowed. I reserve the right to curve the exams depending on students' grades.

Futurization of Airports Presentation – Graduate Students

This is for the "4th credit hour" required of Graduate Students. Students during Week 4 will be introduced to topics regarding the future of airports. Students will be asked to individually select a topic of their interest from a list (or as requested and approved by the professor). Students will do independent research on this topic and create a 10-minute presentation + 5-minute Q & A for the class on the topic. Students will be graded on presentation skills and quality of the production in addition to technical requirements including:

- Understanding of their topic
- How it relates to the airport environment

Engineering Report

The second half of the semester students will be given a sample project and be put in teams of 5 and asked to create documents from project idea through an engineering report.

This will include:

- FAA Justification Memo
- Project Scope
- Project Funding Source
- Planning Basis for Project
    - Growth
    - Fleet Mix
    - Life Cycle Cost Analysis
- Environmental Considerations
- Existing Site Conditions
- Design/Site Considerations

    - Pavement
    - Geometrics
    - Markings
    - Grading Considerations
    - Lighting/Signage
    - NAVaids
    - Buildings
- Alternative Analysis
- Cost Estimate
- Construction Phasing Plan
- Project Justification (Conclusion)

Students will create the 20-30 page document including tables, charts, and graphics.

Progress Memos will be due the beginning of Week 11, Week 13, and Week 15.

10-Minute Presentations will take place December 10 and December 12 during class (asynchronous students we will work this out if the timing doesn't work)

Final Draft due Monday Morning December 15th at 5:00 AM, the end of Week 15.

Students will be graded on completeness of the report, the justification for their alternative chosen, the tables and graphs and images they include, references, and their project conclusion. In addition, students will peer evaluate the others in their group and will also be graded on overall report and presentation quality.

This syllabus – and especially the schedule – is a working document based on guest lecture availability and content as it is being curated. I reserve the right to make any changes as necessary and will update the syllabus and make announcements to students about any changes that occur during the semester.

<u>Statement on the use of Artificial Intelligence for this course:</u>

AI and machine-learning are tools to be used at your discretion. The nature of the content in this class does not lend itself to solely use AI and think you will get full credit on any homework, exam, or final project. I caution you, but there is no ban on its use.