

# EMBRY-RIDDLE AERONAUTICAL UNIVERSITY

## Department of Applied Aviation Sciences

WX 301: Aviation Weather

Section: 02

Spring 2017: 3 Credits

MWF 12 p.m.–12:50 p.m.

CoA 351

Instructor: Prof. Shawn Milrad

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### Office Hours

MWF 1 p.m.–2 p.m., 4 p.m.–5 p.m.; TTh 11:30 a.m.–5 p.m.; or by appt

### Course Overview

Lecture hours/week: 2; Laboratory hours/week: 1

Prerequisites: WX 201 (Survey of meteorology)

Course text (optional, posted on Canvas): *Aviation Weather Services, Advisory Circular AC 00-45H, Ch1*  
(see [http://www.faa.gov/documentLibrary/media/Advisory\\_Circular/AC-0045H\\_fullDocument.pdf](http://www.faa.gov/documentLibrary/media/Advisory_Circular/AC-0045H_fullDocument.pdf))

### Course Goals

- Assist the professionally oriented student in performing aviation-related duties by providing advanced understanding and operational applications of important meteorological concepts.
- Have some fun while gaining more understanding of the weather around us.

### Course Objectives

- Expand on concepts learned in WX 201, with a focus on aviation hazards such as:
  - Convective weather hazards: Thunderstorms, downbursts, hail, high winds etc.
  - Non-convective weather hazards: Fog, icing, turbulence, wind shear, snow and ice
  - Special weather hazards: Volcanic ash, space weather
- Review meteorological concepts such as pressure, atmospheric forces, jet streams, cyclones, and stability. Apply those concepts to aviation hazards.
- Learn how to read and navigate online meteorological data, such as surface and upper-air observations, satellite, radar, and tailored aviation products.
- Complete labs and homework assignments that complement lecture concepts, and provide practical experience in making informed weather-related decisions.
- **Important Note: I will occasionally spend 15 minutes or so of lecture discussing interesting current weather, atmosphere permitting.**

### Course Format

The class will generally be structured with approximately two hours of lecture followed by an hour of lab or practice examples.

## Learning Outcomes:

During the course the student will, to the satisfaction of the instructor:

1. Explain the concept of atmospheric pressure and pressure altimetry to include the impact of changes in atmospheric conditions on pressure altimetry and aircraft performance.
2. Describe the fundamental atmospheric forces and their impact on surface and flight-level winds.
3. Translate meteorological codes (METARs, SPECIs, TAFs, PIREPs) into plain-language format.
4. Analyze and interpret surface and upper-level charts for frontal boundaries, centers of circulation, critical thickness, jets, jet streaks, troughs, divergence, and aviation hazards.
5. Describe the weather conditions and aviation hazards associated with winter mid-latitude cyclones.
6. Describe the aviation hazards associated with clouds and fog, and the meteorological conditions favorable for instrument meteorological conditions.
7. Identify the various agencies responsible for issuing primary and supplementary aviation weather products (e.g., watches, warnings, outlooks, AIRMETS, SIGMETS, CWAs, MISs).
8. Analyze surface observations, satellite images, and numerical model data to assess hazards associated with instrument meteorological conditions
9. Describe common types of thunderstorms, aviation hazards associated with thunderstorms and lightning, and the meteorological conditions favorable for instability and convection development.
10. Analyze surface observations, upper-air soundings, lightning data, satellite images and radar images to assess atmospheric instability and hazards associated with convective weather and lightning.
11. Describe the common types of turbulence, aviation hazards associated with turbulence and low-level wind shear (LLWS), and the meteorological conditions favorable for the formation of each.
12. Analyze upper-air soundings, upper-air wind charts, graphical turbulence charts, satellite images, and numerical model data to assess hazards associated with turbulence.
13. Describe the common types of icing, the aviation hazards associated with icing, the meteorological conditions favorable for the formation of icing, and the potential courses of action to mitigate icing.
14. Analyze upper-air soundings, icing potential charts, satellite and numerical model data to assess hazards associated with icing.
15. Describe and assess the aviation hazards associated with space weather and volcanic ash to include potential courses of action to mitigate the hazards.
16. Analyze online weather data to complete an effective weather self-briefing and flight plan.

## Grading

- **2 multiple-choice midterm exams covering both lectures and labs:** 50% (25% each)
- **Comprehensive Final Exam:** 30%
- **Labs and HW:** 20%

Note: You will usually have an opportunity to work on labs during class. All Labs and HWs will be weighted equally and typically be **due two class periods after they are assigned. Working in small groups is highly encouraged.**

- **Attendance will affect your grade in the following ways:**

0 unexcused absences	+2.0% to final grade
1 unexcused absence	+1.5% to final grade
2 unexcused absences	+1.0% to final grade
3-7 unexcused absences	+0% to final grade
>7 unexcused absences	<b><u>Loss of full letter grade</u></b>

- **Final grades:** *Strictly* rounded to the nearest whole degree, i.e., 89.5 = "A," but an 89.4 = "B." Your attendance record is intended to be the discriminator for borderline grades.

<b>A</b>	<b>90-100</b>
<b>B</b>	<b>80-89</b>
<b>C</b>	<b>70-79</b>
<b>D</b>	<b>60-69</b>
<b>F</b>	<b>59 or below</b>

## Class Policies

1. **Seven or more unexcused absences** will result in an automatic loss of one full letter grade.
2. Signing the attendance roster as proof of attendance is the responsibility of the student.
3. **Official excused absences will not hurt your grade, but they can prevent you from meeting your FAA Dispatch Program attendance requirements.** For those enrolled in the FAA Dispatch Program, the FAA has specific attendance requirements. Any missed class hours and content appropriate to the dispatch program must be made up. How this is accomplished is left to the discretion of the instructor. Some possibilities could include; (a) having the student attend another section of the course where the material is covered, (b) giving the student an assignment that would cover the material and take approximately the amount of contact time missed, (c) reviewing the material with the student (or having it reviewed with the student in the tutor lab). The method used is left to the discretion of the instructor as long as the content and hours are commensurate with that missed in the class. The student is responsible for making up missed work. Making up work for FAA dispatch grades CANNOT be used for the attendance bonus.
4. Students must submit each excused absence in writing (email is acceptable) prior to the start of class (with the obvious exception of extreme personal or family medical emergencies). Illnesses extending more than one class period require documentation from the university health clinic or other medical professional. University-sponsored events require written documentation. Examples of valid excuses are: illness, medical emergency, university-sponsored academic, professional or ERAU athletic events. Oversleeping, personal vacations, club events are not valid excuses.
5. Please be on time. Arriving late is disruptive to me as well as your classmates. If a student is more than 10 minutes late to class, it may be counted as an unexcused absence.
6. Official excused absences will not count against your attendance record but will count against your FAA Dispatch Program attendance. Note: If enrolled in the Dispatcher Program, FAA requires 90% attendance. More than 10 minutes tardy without prior notification counts as an unexcused absence.
7. Late labs and HW will be docked one full letter grade (10%), unless the absence is excused in advance. Unexcused homework and labs over 1 class period late will not be accepted.
8. Exams will be announced at least one week in advance. Make-up exams will not be given except for excused absences.
9. Academic dishonesty will not be tolerated. Academic dishonesty could result in dismissal from the University.
10. If you have any difficulties or special needs that hinder your learning in the class, please see me about providing accommodations needed to overcome your difficulties.
11. **CELL PHONES:** During class, please turn all cell phones to vibrate or silent, and please refrain from checking email, Facebook, Twitter, Instagram, Snapchat, etc. during class.
12. **COMPUTER USAGE:** Computers are only to be used for labs, following along with lectures or when directed by the professor. Please refrain from checking/using email, Facebook, Twitter, etc. during class.
13. **PERSONAL CONVERSATIONS:** With the exception of during labs or when directed by the instructor, personal conversations are prohibited during class, including cell phone conversations and text messaging (or any kind of instant messaging).

**Important note: I am here to help you as much as I can. Please feel free to contact me or stop by my office at any time. If I am not around, just send me an email, and I will get back to you ASAP.**

**Course Calendar:**

The following calendar is a draft schedule of class topics. The schedule is subject to change if necessary.

<b>Fall 2017 WX301 - Section 02</b>							
	Sun	Monday	Tues	Wednesday	Thur	Friday	Sat
Aug/Sep	27	28 Introduction Web Pages of Interest	29	30 Pressure Basics	31	1 Pressure Altimetry	2
Sep	3	4 No Class Labor Day	5	6 Pressure Altitude and Density Altitude  (Pressure Altimetry Lab/HW)	7	8 <b>IRMA</b>	9
	10	11 <b>IRMA</b>	12	13 <b>IRMA</b>	14	15 Clouds and Fog: An Aviation Perspective	16
	17	18 Aviation Wx Codes: METARs (Pressure Altimetry Lab/HW Due)	19	20 Aviation Wx Codes: TAFs and PIREPs (Aviation Wx Codes Lab/HW)	21	22 Surface Observing Systems (e.g., ASOS) and Manual Observing	23
	24	25 Pressure and Winds	26	27 Pressure and Winds (Manual Observations Lab/HW, online only) (Aviation Wx Codes Lab/HW Due)	28	29 Thermal Wind and Jets (Pressure and Winds Lab/HW)	30
October	1	2 Mid-Latitude Cyclones (Manual Observation Lab/HW Due)	3	4 <b>Exam #1 Review</b> (Pressure and Winds Lab/HW Due)	5	6 <b>Exam #1</b> (Pressure/Altimetry thru Mid-latitude Cyclones)	7
	8	9 Weather Analysis: Surface Station Plots and Fronts	10	11 Satellite IMC/MTOS (Weather Analysis Lab/HW)	12	13 Satellite IMC/MTOS (Satellite/IMC/MTOS Lab/HW)	14
	15	16 Skew-T plotting and Atmospheric Stability (Weather Analysis Lab/HW Due)	17	18 Skew-T plotting and Atmospheric Stability (Stability Lab/HW) (Satellite/IMC Lab/HW Due)	19	20 No Class Fall Break	21
	22	23 Thunderstorms and Convection	24	25 Lightning (Stability Lab/HW Due)	26	27 Weather Radar	28

Oct/Nov	29	30 Convective Products Radar/Convection Lab/Hw	31	1 Exam #2 Review (Radar/Convection Lab/HW Due)	2	3 Exam #2 (Surface Station Plots through Radar/Convection)	4 Manual Observation Roof Lab, regular class period
November	5	6 Winter weather (Winter Wx HW)	7	8 Icing – Aircraft Performance	9	10 Icing – Meteorological Conditions, products and tools. (Winter Wx HW due) (Icing Lab/HW)	11
	12	13 Low-level Wind Shear (LLWS)	14	15 Low Level Turbulence (Icing Lab/HW Due)	16	17 Upper-Level Turbulence (CAT and MWT)	18
	19	20 Convective Turbulence (CIT) (Turbulence Lab/HW)	21	22 No Class Thanksgiving Break	23	24 No Class Thanksgiving Break	25
Nov/Dec	26	27 Special Hazards: Volcanic Ash and Space Wx (Special Hazards HW)	28	29 Flight Planning Basics and Tools (Turbulence Lab/HW due)	30	1 (Special Hazards HW Due) Flight Planning Lab/HW)	2
December	3	4 Course Wrap Up	5	6 Final Exam Prep (Flight Planning Lab/HW Due)	7	8 No Class Study Day	16 FINALS BEGIN
	10	11	12	13	14	15	

**FINAL EXAM: Wednesday 12/13, 7:15–9:15 p.m., COA 351**