

COMMON COURSE NUMBER:   ASC 1210  

COURSE TITLE:   Aviation Weather  

CREDIT HOURS:           3          

CONTACT HOURS BREAKDOWN:

Lecture/Discussion           48          

Lab   

Other   

Contact Hours/Week           3          

CATALOG COURSE DESCRIPTION:

Prerequisite: ATT1100 and ASC1100

Corequisite: ATT2120 and ASC2110

A study of the basic concepts of meteorology, temperature, pressure, moisture, stability, clouds, air masses, fronts, thunderstorms, icing, and fog analysis and use of weather data, interpretation of the U.S. Weather Bureau maps, reports, and forecasts. Prerequisite: Private pilot's license or instructor's permission.

General Education Requirements - Associate of Arts Degree, meets Area(s):  
General Education Requirements - Associate in Science Degree, meets Area(s):

UNIT TITLES:

1. The Atmosphere
2. Pressure and Altimetry
3. Circulation
4. Moisture
5. Stability
6. Clouds
7. Air Masses and Fronts
8. Turbulence
9. Icing
10. Thunderstorms

11. IFR Producers
12. Aviation Weather Service Program
13. Aviation Weather: Teletype and CRT information
14. Aviation Weather: Chart Information

## **I. Course Overview:**

Upon successful completion of this course, the students should be able to acquire the meteorological knowledge necessary to prepare them for the weather related portions of the Federal Aviation Administration's Commercial Written and Instrument Written Exams. In addition, the students should have knowledge of the elements of meteorology pertinent to a professional aviator in developing his/her ability to recognize critical weather situations; and to read and interpret weather reports, forecasts, and charts.

## **II. Units:**

### **Unit 1. The Atmosphere**

#### General Outcome:

1.0 The students should be able to discuss the composition of the atmosphere and temperature scales.

#### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

1.1 List and discuss the layers of the atmosphere.

1.2 Discuss the composition of the atmosphere.

1.3 Apply differing temperature scales and methods of conversion.

1.4 Calculate problems using lapse rate and temperatures aloft.

## Unit 2. Pressure and Altimetry

### General Outcome:

2.0 The students should be able to discuss atmospheric pressure and its relation to altimetry.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 2.1 Describe methods of measuring pressure.
- 2.2 Discuss pressure variation with change in temperature and altitude.
- 2.3 Discuss pressure systems including low, highs, troughs, ridges and cols.
- 2.4 Define various types of altitude.
- 2.5 Explain various effects of pressure and temperature changes on altimeter readings.

## Unit 3. Circulation

### General Outcome:

3.0 The students should be able to discuss general atmospheric circulation as well as local and small scale winds.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

- 3.1 Relate convection and the pressure gradient force.
- 3.2 Explain and apply the Coriolis force.
- 3.3 Discuss circulation on a global basis including belts of prevailing winds and pressures.
- 3.4 Discuss friction and its effects on winds with relation to isobars.
- 3.5 Describe wind circulation about pressure systems.  
(cyclones and anticyclones).
- 3.6 Compare and contrast local and small scale winds including but not limited to: mountain and valley winds, land and sea breezes and katabatic winds.

## Unit 4. Moisture

### General Outcome:

4.0 The students should be able to discuss atmospheric moisture and the importance of it as it relates to weather.

### Specific Learning Outcomes:

Upon successful completion of this unit, the students should be able to:

4.1 Describe the relationship that exists between temperature, dew point and relative humidity.

4.2 Discuss the process of condensation and precipitation.

4.3 Describe changes of state.

4.4 Differentiate among dew and frost.

## Unit 5. Stability

### General Outcome:

5.0 The students should be able to discuss and calculate problems dealing with adiabatic lapse rates. In addition, the students should be able to discuss atmospheric stability and how it relates to cloud formation.

### Specific Learning Outcomes:

Upon successful completion of this unit the students should be able to:

- 5.1 Calculate problems using the dry adiabatic lapse rate.
- 5.2 Compare/contrast dry adiabatic lapse rate with moist adiabatic lapse rate.
- 5.3 Calculate problems using dew point lapse rate to determine cloud height.
- 5.4 Discuss effects of a stable or unstable atmosphere on cloud formation.

## Unit 6. Clouds

### General Outcome:

6.0 The students should be able to identify a variety of clouds and discuss their characteristics.

### Specific Learning Outcomes:

Upon successful completion of this unit the students should be able to:

- 6.1 List and explain cloud families.
- 6.2 Distinguish among a variety of different types of clouds.
- 6.3 Explain the differing composition of clouds.
- 6.4 Describe what weather phenomena are associated with individual clouds.

## Unit 7. Air Masses and Fronts

### General Outcome:

7.0 The student should be able to discuss frontal activity and associated weather hazards.

### Specific Learning Outcomes:

Upon successful completion of this unit the students should be able to:

- 7.1 Define air masses of differing types and discuss related moisture, temperature and stability characteristics.
- 7.2 Compare/contrast source regions and discuss air mass modification.
- 7.3 Define a front and discuss discontinuities that occur while crossing the front.
- 7.4 Differentiate among warm, cold, occluded and stationary fronts.
- 7.5 Discuss the unique associated weather changes which occur with each type of front.
- 7.6 Define a variety of terms associated with frontal systems.

## Unit 8. Turbulence

### General Outcome:

- 8.0 The student should be able to define several types of turbulence and have an understanding of associated hazards.

### Specific Learning Outcomes:

Upon successful completion of this unit the students should be able to:

- 8.1 Define convective currents, their formation and their effect on aircraft.
- 8.2 Discuss hazards of obstruction to wind flow, especially in the airport environment.
- 8.3 Discuss mountain wave formation and associated hazards.
- 8.4 Define wind shear, and be aware of places that it is most often encountered.
- 8.5 Define wake turbulence and discuss avoidance procedures.
- 8.6 Recognize the hazards of turbulence and understand necessary precautions to avoid it as well as measures used upon encountering turbulence.

## Unit 9. Icing

### General Outcome:

- 9.0 The student should have an understanding of differing icing types and their associated hazards to the pilot.

### Special Learning Outcomes:

Upon successful completion of this unit the students should be able to:

- 9.1 Define necessary conditions to create an icing hazard.
- 9.2 Define various types of structural icing and discuss characteristics of each specific icing type.
- 9.3 Discuss induction system and instrument icing.
- 9.4 Categorize specific icing types with associated cloud types.
- 9.5 Discuss various methods of preventing icing and methods of removing ice.

## Unit 10. Thunderstorms

### General Outcome:

10.0 The students should have an understanding of thunderstorm formation, associated weather, and avoidance.

### Specific Learning Outcomes:

10.1 Determine where and why thunderstorms most frequently occur.

10.2 Explain the life cycle of a thunderstorm.

10.3 Discuss associated weather often occurring within the vicinity of the thunderstorm.

10.4 Discuss using weather radar for thunderstorm flying.

10.5 Explain avoidance procedures used in thunderstorm flying.

## Unit 11. IFR Producers

### General Outcome:

11.0 The students should be able to describe a variety of weather conditions which often are responsible for the creation of IFR weather.

### Specific Learning Outcomes:

Upon successful completion of this unit the students should be able to:

- 11.1 Describe various types of fog including but not limited to radiation, advection, upslope, frontal, and ice fog.
- 11.2 Define obscuration and phenomena responsible for this condition.
- 11.3 Understand the threat of flying VFR into adverse weather, the warning signs, and the procedures used to avoid these hazards.

## Unit 12. Aviation Weather Service Program

### General Outcome:

12.0 The students should have an understanding of what agencies collect and distribute pertinent weather information.

### Specific Learning Outcomes:

12.1 Describe various methods of gathering and distributing weather information.

12.2 Identify various weather service forecast offices.

12.3 Discuss the importance of flight service stations and information they supply specifically including but not limited to TWEB, PATWAS and the weather briefing.

12.4 Recognize a variety of ways to receive weather information such as the telephone, closed circuit T.V., recorded briefings and enroute flight advisory service.

## Unit 13. Teletype Aviation Weather and CRT information

### General Outcome:

13.0 The students should be able to identify, read and interpret a variety of teletype and CRT information.

### Specific Learning Outcomes:

13.1 Interpret surface aviation weather reports.

13.2 Interpret pilot and radar weather reports.

13.3 Interpret terminal forecasts.

13.4 Interpret area forecasts.

13.5 Define and interpret CONVECTIVE SIGMETS, SIGMETS and AIRMETS.

## Unit 14. Aviation Weather Chart Information

### General Outcome:

14.0 The students should be able to identify, read and interpret a variety of weather charts.

### Specific Learning Outcomes:

Upon successful completion of this unit the students should be able to:

14.1 Interpret Surface Analysis Charts.

14.2 Interpret Weather Depiction Charts.

14.3 Interpret Radar Summary Charts.

14.4 Interpret Low Level and High Level Significant Weather Prognostic Charts.

14.5 Interpret Winds and Temperature Aloft Chart.

14.6 Interpret Severe Weather Outlook Chart.

14.7 Interpret Constant Pressure Analysis Charts.