**Instructor:**
Professor Gregory Tripoli  
AOS 1431  
262-3700  
Office Hours: MWF 2:00-3:20pm

**TA:**
Daniel Henz  
AOS 1439 (lab), 1449 (office)  
Office Hours: TBD

**Web page:**
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**Grading:**

**Formal Laboratory (30%)**  
Lab Assignments 25%  
1. Misc  
2. MOAXS  
3. DSWS  
4. SS  
Weather Discussions 5%

**Case Studies (40%)**  
Major Case Study 1 15%  
Major Case Study 2 20%  
Major Case Study 2 Presentation 5%

**Exams (30%)**  
Quizzes 7.5% each  
(5 quizzes total, 1 dropped)

Assignments will be turned in at the **beginning** of lab on the assigned due date. Assignments turned in after the start of lab will be considered late! Late assignments can still be turned in for partial credit. Each day the assignment is late will result in a (20%) penalty NO EXCEPTIONS! i.e. if the assignment is turned in 2 days late, the starting grade will be 60%.

**Suggested Reading:**
7. *Synoptic-Dynamic Meteorology in Middle Latitudes Volume II: Observations and Theory of weather Systems*, Bluestein
Lecture Syllabus

I. Introduction to Mesoscale Meteorology (2 lectures)
   i. Mesoscale Classifications (Ch 2 MMF)
      1. Rossby Radius of Deformation
      2. Relative to Rossby Radius
      3. Orlanski Classification

II. Atmospheric Convective Instabilities (9 lectures)
   i. Synoptic Destabilization (1 lecture)
      1. Upper Level Mixed Layers
      2. Synoptic Lifting
      3. Dynamic Destabilization
      4. Differential Advection
   ii. Dry-Convection instabilities
   iii. Cumulus Cloud Dynamics (1 lecture)
      1. Concept of Buoyancy
      2. Concept of Entrainment
   iv. Basic Moist Convective Instabilities (Ch11 MMF) (2 lectures)
      1. Conditional Instability of the First Kind
      2. Conditional Instability of the Second Kind
      3. Conditional Symmetric Instability
   v. Deep convection organization (5 lectures)
      1. Ordinary Cumulonimbi
      2. Multi-cell thunderstorms
      3. Supercell thunderstorms
      4. Tornadoes

III. Orographic Mechanically Driven Mesoscale Circulations (3 lectures)
   i. Upslope Precipitation (Ch 19 MMF) (1 lectures)
   ii. Orographically enhanced Convection (Ch 19 MMF) (1 lecture)
   iii. Downslope Wind Storms (Ch 12, Ch 20 MMF) ( 1 lectures)

Spring Break

IV. Mesoscale Boundary Layer Circulation Systems and Clouds (4 lectures)
   i. Fog
   ii. Boundary Layer Convection
   iii. Strato-Cumulus
   iv. Arctic Stratus
v. Lake Effect Storms

V. Mesoscale Circulation Systems and Storms (14 lectures)
i. Thermally Driven Mesoscale Circulation Systems in the Planetary Boundary Layer (PBL) (4 lectures)
   1. Sea and Lake Breeze Systems (1)
   2. Vegetation and Land-use Induced Circulations
   3. Orographic Thermally Driven Mesoscale Circulations (1 lectures)
   4. Dry Line (inland sea breeze) circulations (Ch 23 MMF) (1 lecture)
   5. Nocturnal Southerly Jet (1 lecture) (march 1)

ii. Meso-Beta-scale Convective Systems (B, 3.4, Ch 15 MMF) (6 lectures)
   1. Middle Latitude Squall Lines
   2. Super Cellular Squall Lines
   3. Derecho Convective Systems and Bow Echos
   4. Australian Squall Lines
   5. Tropical Squall Lines (Ch 16 MMF)
   6. Overview of Severe Weather
      a. Tornadoes and Tornado genesis (Ch 18 MMF)
      b. Downbursts, Microbursts (CA Ch 9)
      c. Hail (CA Ch 9)
      d. Flash Floods (CA Ch9, CH13 MMF)

iii. Meso-Alpha-scale Convective Systems (B, 3.4, Ch 15 MMF) (4 lectures)
   1. Orogenic Convective Systems
   2. Prefrontal Squall Lines
   3. Mesoscale Convective Complexes and Tropical Cloud Clusters (Ch 17)
   4. Air-Sea Interaction Cyclones (2 lectures)
   5. Tropical Cyclone
   6. Polar Low