Instructor: Dr. Hong-Bing Su  
Department: Geography  
Office: Brewster Building A-223  
Phone: (252)328-1040  
E-mail: suh@ecu.edu

<table>
<thead>
<tr>
<th>Time</th>
<th>M–W 12:00–13:50</th>
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<tr>
<td>Location</td>
<td>Brewster B-102</td>
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<tr>
<td>Office Hours</td>
<td>Tu–Th 11:00-13:00 or by appointment</td>
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**Course Descriptions**  
- On-line Undergraduate Catalog: 1300. Weather and Climate (4) (F,S,SS) (FC:SC)  
- Introductory survey of meteorology including weather and climate principles, processes, and patterns, at a variety of scales from local to global. It is the first course in atmospheric sciences.  
- It is a prerequisite for the core courses for a Certificate in Atmospheric Science offered by the Department of Geography at East Carolina University.

**Main Objectives & Learning Outcomes**  
- Students will be able to describe the basic compositions and structures of the atmosphere, and the temporal and spatial characteristics of weather events and climate patterns.  
- Students will be able to explain qualitatively the key forces and physical processes driving ever changing weather and climate.  
- Students will gain simple hands-on experiences in meteorological observations, calculations, analyses and interpretations of weather patterns and variables.

**Textbook (Not required)**  
- Understanding Weather & Climate Fifth Edition  
  Authors: Edward Aguado & James E. Burt  
- Lecture notes will be provided in PDF files on the course web page.

**Webpage**  
- [http://core.ecu.edu/geog/suh/Courses/Courses.html](http://core.ecu.edu/geog/suh/Courses/Courses.html) (An access code is given in the 1st class).

**Exams**  
- 2 mid-term exams (20% each), final exam (30%). None of the exams can be dropped.  
- In-class and take-home exercises count for 30% of the course grade.  
- All exams are close-book (paper or electronic) and non-cumulative.  
- Each exam may be adjusted according to all scores.  
- The date for two mid-term exams will be announced a week in advance.  
- The final exam date is set by the university and it will be given in the same classroom.

**Grade**  
- Scale:  
  - A (85 – 100%)  
  - B (70 – 84.9%)  
  - C (55 – 66.9%)  
  - D (50 – 54.9%)  
  - F (<50%)

**Studying Tips**  
- Attend all classes.  
- Be interactive in class: ask and answer questions, take notes, do exercises.  
- Mark any questions you have during the lectures or self-studies, and not let those questions accumulate and hinder your understanding of follow-up materials.  
- Take advantage of office hours.

**Make-up Exams**  
- A make-up exam may be offered **ONLY** if a verifiable and university allowed excuse, such as a doctor's note, is provided to the instructor.

**ADA Statement**  
- East Carolina University seeks to comply fully with the Americans with Disabilities Act (ADA). Students requesting accommodations based on a disability must be registered with the Department for Disability Support Services located in Slay 138 ((252) 737-1016 (Voice/TTY)).  
- [http://www.ecu.edu/cs-studentlife/dss/](http://www.ecu.edu/cs-studentlife/dss/)

**Attendance Policy**  
- Attendance to classes is required. Students need to sign the attendance sheet in each class.  
- 1-point will be deducted from the final course grade for each missed class. The first day of class (January 11, 2010) is exempted.  
- Same excuses allowed for make-up exam apply here.
Outline of Topics

<table>
<thead>
<tr>
<th>Overview:</th>
<th>weather hazard, Definitions of the atmosphere, weather, climate, atmospheric science, meteorology, climatology.</th>
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<tbody>
<tr>
<td>1. Composition and Structure of the Atmosphere</td>
<td>thickness, composition, vertical structure</td>
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<tr>
<td>2. Causes of Earth’s Seasons</td>
<td>Earth-Sun geometry, Earth’s revolution and rotation, day length, seasons</td>
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<tr>
<td>3. Energy and Radiation</td>
<td>kinds of energy, energy transfer mechanisms, radiation properties and principles, electromagnetic spectrum, solar constant, atmospheric absorption, reflection, scattering, transmission of isolation, fate of solar radiation (at the top of the atmosphere vs. at the Earth’s surface), radiation balance, global patterns, seasons, day &amp; night, clear &amp; cloudy</td>
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<td>4. Energy Balance and Water Balance</td>
<td>energy transfer processes between the surface and the atmosphere, energy balance, net radiation, sensible and latent heat fluxes, soil heat flux</td>
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<td>5. Temperature</td>
<td>3 temperature scales, global temperature distributions, greenhouse effect, influences on temperature, daily and seasonal variations, clear vs. cloudy, means &amp; ranges, wind chill temperature, heat index</td>
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<td>6. Atmospheric Pressure and Wind</td>
<td>concept of pressure, ideal gas law, pressure gradient, hydrostatic equilibrium, wind forces: Coriolis force, friction, gravity, centripetal (or centrifugal) force, geostrophic wind (supergeostrophic &amp; subgeostrophic flows), gradient wind, cyclones &amp; anticyclones, troughs &amp; ridges, divergence &amp; convergences</td>
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<td>7. Atmospheric Moisture and Stability</td>
<td>evaporation &amp; condensation, indices of atmospheric moisture, diabatic &amp; adiabatic processes, environmental lapse rate, static stability</td>
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<td>8. Cloud and Precipitation</td>
<td>Cloud formation (lifting mechanism, stability, lapse rates), cloud types, growth of cloud droplets, forms of precipitation, measuring precipitation</td>
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<td>9. Atmospheric Circulation</td>
<td>single cell model, three-cell model, semi permanent pressure cells, polar fronts &amp; jet streams, troughs, ridges and Rossby waves, major wind systems (monsoons, katabatic winds, sea-land breeze, etc.), air-sea interactions, El Nino, La Nina, Walker Circulation, ENSO</td>
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<td>10. Weather Patterns</td>
<td>air masses, source regions, fronts, the life cycle of mid-latitude cyclones, Rossby wave and vorticity, interactions of surface and upper-level conditions, flow patterns and large-scale weather, mid-latitude cyclones</td>
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<td>11. Violent Storms</td>
<td>thunderstorms, tornadoes, hurricanes</td>
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<td>12. Weather Analysis and Forecasting</td>
<td>forecasting methods, types of forecasts, assessment of forecasts, data acquisition &amp; dissemination, forecast procedures &amp; products, weather maps and images, numerical forecast models</td>
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