

METEOROLOGY (MT)

MT 1000 Intro to Weather Community (1 Credit)

First-semester introduction to the meteorology major that helps students transition to the college environment. Introduces (1) meteorology faculty, staff, and resources; (2) ideas for success, study skills, critical thinking, work ethic, and professionalism; and (3) careers in meteorology, including forecasting, research, and broadcasting. Round-table discussions; presentations by students and faculty. Pass/No Pass. Falls. Open to meteorology majors only.

MT 2110 Introduction to Atmospheric Sciences (3 Credits)

Fundamental description of atmospheric processes and phenomena. The global energy budget, winds, air masses, fronts, clouds, snow, rain and hail, thunderstorms, tornadoes and hurricanes are among the topics covered. Falls.

MT 2230 Introduction to Meteorological Analysis (1 Credit)

An introduction to basic analytical methods used in meteorology (e.g., surface and upper-air maps and thermodynamic charts). Supportive laboratory exercises are also included. Additional course fee required. Falls.

Prerequisite(s): Biology, Chemistry, Computer Science, Meteorology majors.

Corequisite(s): MT 2110.

MT 2800 Climatology (3 Credits)

A descriptive climatology course covering the 3 main areas of climatological study: physical climatology, regional climatology and applied climatology. Topics include: physical processes responsible for climate; major climate regions and climate classifications; the effect of climate on human cultures and societies; and theories of climate change including natural and anthropogenic processes. Springs. (GACO)

Prerequisite(s): MT 2110.

MT 3230 Atmospheric Thermodynamics (3 Credits)

Development of the kinetic theory of gases. Treatment of the First and Second Laws of Thermodynamics, with emphasis on atmospheric applications. Adiabatic processes, stability and the use of thermodynamics diagrams. Use of computer applications. Severe weather indices. Additional course fee required. Springs.

Prerequisite(s): MT 2110, MA 2550, and PH 2410.

MT 3300 Synoptic Meteorology I (4 Credits)

An introduction to the techniques used to understand synoptic-scale atmospheric processes and their application to weather analysis and forecasting. Topics include: decoding and plotting standard meteorological data; plotting and interpretation of thermodynamic diagrams and cross-section analyses; manual analyses of upper-air and surface data; survey of weather graphics products from both facsimile and Internet resources; kinematics of meteorological scalar and vector fields; introduction to basic forecasting techniques; a survey of operational forecast models. Additional course fee required. Falls.

Prerequisite(s): MA 2550 (may be concurrent) and MT 2110.

MT 3710 Meteorological Instruments and Observations (4 Credits)

Utilization of standard meteorological instruments. Practical problems in measurements and recording systems. Data reduction and analysis. Introduction to 1 or more data analysis software packages. Experimental meteorological literature. One lecture and 1 laboratory session each week plus individual writing assignments. Additional course fee required. Falls. (WRCO)

Prerequisite(s): MT 2110 and MA 2550 (may be concurrent).

MT 4150 Air Quality (3 Credits)

Encompasses an extensive overview of the science of Air Quality. Topics include atmospheric chemistry, air quality meteorology and forecasting techniques, air pollution sources, sinks and effects (atmospheric, environmental), including an examination of historical and current policy issues relevant to each topic. May be taken as CH 4150. Spring of odd years. (INCO)

Prerequisite(s): CH 2340, MT 2110, (MA 2490 or MA 2550), and Junior status.

MT 4262 Broadcast Meteorology (3 Credits)

Introduction to broadcast presentation skills and the utilization of meteorological graphics software. Examines professional broadcast meteorology certification requirements. Introduces geographical terminology for local, regional, synoptic, and global areas. Discusses evolution of broadcast meteorology and future trends. Students prepare sample weathercast segments and produce a station scientist video production on subjects satisfying guidelines provided by the American Meteorological Society. Additional course fee required. Springs.

Prerequisite(s): MT 2800 and MT 3300.

MT 4280 Synoptic Meteorology II (4 Credits)

Intermediate weather analysis and forecasting techniques are used to understand synoptic-scale weather systems with an emphasis on structure and evolution of extratropical cyclones. Topics include: climatology of mid-latitude surface and upper-air flow regimes and extratropical cyclogenesis; life cycle of extratropical cyclones including frontal evolutions; application of hydrodynamical equations and balanced systems to weather analysis and forecasting; ageostrophic winds; jet streak circulations. Students participate in weekly forecasting exercises culminating in a quantitative precipitation forecasting exercise at the end of the semester. Additional course fee required. Springs. (TECO)

Prerequisite(s): MT 3300.

Corequisite(s): MT 4320.

MT 4310 Dynamic Meteorology I (3 Credits)

Introduction to geophysical fluid dynamics including the development of the fundamental equations, governing atmospheric motion, basic approximations, simplified flows and physical interpretation of the corresponding theory. Falls.

Prerequisite(s): MA 2560, MT 3230, and PH 2420.

MT 4320 Dynamic Meteorology II (3 Credits)

Advanced topics in geophysical fluid dynamics including circulation theory, vorticity, planetary boundary layer, quasi-geostrophic theory and introductory numerical modeling concepts. Springs.

Prerequisite(s): MT 4310 and MA 3540 (may be concurrent).

MT 4330 Current Weather Seminar (1 Credit)

Discussions of daily weather maps and data from the National Meteorological Center. Technical emphasis; presentations by faculty and students. May be repeated once.

Prerequisite(s): MT 4280 (may be concurrent).

MT 4360 Forecasting/Broadcast Practicum (1 Credit)

Provides students an opportunity to improve forecasting, computer software and communication skills while formally meeting forecast deadlines on a daily basis. Forecasts are prepared and presented for broadcast on local media outlets. May be repeated for a maximum of 2 credits. Additional course fee required.

Prerequisite(s): (MT 4260 or MT 4262), MT 4280 (may be concurrent); permission of the instructor.

MT 4400 Numerical Weather Prediction (3 Credits)

Acquaints students with the concepts, procedures, theory, and problems associated with numerical weather prediction through discussion and by writing computer programs to process both real and simulated data. Covers the mathematical basis for various analysis and predictive techniques and their benefits and/or limitations. Students learn about the configuration and capabilities of current operational numerical analysis and prediction models. Falls. (INCO)(TECO)
Prerequisite(s): CS 2400, MT 4320, permission of the instructor, and Junior status.

MT 4410 Atmospheric Physics (3 Credits)

An application of the basic laws of physics to atmospheric processes. Topics discussed include gravitational effects, properties of atmospheric gases, cloud physics, solar and terrestrial radiation, atmospheric electricity and optical and acoustic phenomena. Falls.
Prerequisite(s): MA 2560, MT 3230, and PH 2420.

MT 4420 Tropical Weather and Climate (3 Credits)

An in-depth view of various topics related to tropical weather and climate, including tropical climatology, easterly waves, tropical cyclones, monsoons, El Niño, La Niña and the Southern Oscillation (ENSO), and other types of tropical variability. Spring of even years. (INCO)
Prerequisite(s): MT 3300, PH 2410, and Junior status.

MT 4440 Climate Change (3 Credits)

Overview of the methods for examining climate change. Included are time series analysis and climate proxies such as tree-ring analysis, $\delta^{18}O/\delta^{16}O$ ratios, pollen and carbon-14 dating. Also covered are a variety of possible causal factors such as orbital variations, plate tectonics, volcanic eruptions, CO₂ variations and El Niño. The results of paleoclimatic modeling are also discussed. May be taken as ESP 4440. Springs. (INCO)
Prerequisite(s): MT 2110, (PH 2130 or PH 2410), and (MA 2490 or MA 2550); Junior status.

MT 4450 Advanced Synoptic Meteorology (3 Credits)

Use of advanced analysis techniques for multiscale weather systems throughout the globe with an emphasis on synoptic-scale mid-latitude weather. Topics include: forecasting applications of the quasi-geostrophic height tendency and omega equations; frontogenesis; Q-vector analysis; isentropic analysis; Hovmöller diagrams, potential vorticity concepts and the use of dynamic tropopause maps. Weekly weather discussions and forecasting exercises focus on these advanced techniques and areas of current or future applied research topics. Recent articles in the scientific literature are reviewed and used throughout the course. Falls.
Prerequisite(s): MT 4280 and MT 4320.

MT 4460 Climate Dynamics (3 Credits)

Introduction to the mean thermodynamic state of the atmosphere and connections to transient weather phenomena, including zonal and eddy flow interactions, energy and momentum flux, troposphere-stratosphere interactions, and subseasonal-to-interannual atmospheric interactions with the cryosphere, hydrosphere, and pedosphere. Falls.
Prerequisite(s): MA 3500 and (MT 4320 or concurrent registration).

MT 4480 Mesoscale Meteorology (3 Credits)

Focuses on the detailed descriptive aspects of mesoscale phenomena and processes with an emphasis on the structure. Defines what is meant by the term "mesoscale" and to what kinds of systems it applies. Deals with internally generated mesoscale circulations. Examines various mesoscale convective systems. Discusses externally forced mesoscale systems. Using observational cases, covers terminology, characteristics, and behavior of mesoscale events. Springs.
Prerequisite(s): MT 4320 (may be concurrent).

MT 4500 Undergraduate Research (1-4 Credits)

Guided research in atmospheric sciences under the supervision of a faculty advisor. Repeatable for credit.
Prerequisite(s): permission of the instructor.

MT 4560 Topics in Meteorology (1-4 Credits)

Covers material related to a major subdiscipline in Meteorology that is not covered in the regular curriculum. May be repeated with a different topic so that students can receive exposure to a variety of subject areas.
Prerequisite(s): MT 3300, MT 4310, and permission of the instructor.

MT 4600 Internship (1-4 Credits)

Involves 1-4 weeks of full-time work or equivalent part-time work at a private or governmental forecast office, weather observatory or broadcasting facility. The on-site experience is provided to give students an opportunity to become more familiar with meteorological equipment and forecasting procedures and to participate in daily weather observations, discussions, and presentations as appropriate. Compensation is not necessarily provided for intern time. One credit is given for each 40-hour week of participation. Students must submit a written report when the internship is completed. Repeatable for credit.
Prerequisite(s): MT 2110 and permission of the instructor.

MT 4910 Independent Study (1-4 Credits)

Ordinarily for Meteorology majors. Studies undertaken are defined by students, subject to approval by appropriate staff members. Work may involve reading, conferences, historical, experimental or theoretical projects, field investigations, statistical surveys or combinations of the foregoing. Consent required of the instructor who will supervise the independent study and the Department Chair.