

METEOROLOGY (METR)

METR 100 Weather and Climate

Prerequisites: MATH 101 or higher; or a qualifying Math Placement Exam score for MATH 102 or 104 or higher

Description: Physical behavior of the atmosphere; elements of weather and climate and their distribution over the earth. Weather map analysis and forecasting. Atmospheric circulation, precipitation processes, severe weather, air pollution, and the use of weather radar. Concepts of weather forecasting.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

Prerequisite for: GEOL 372; METR 153; METR 205; METR 270; METR 370, NRES 370; METR 446

ACE: ACE 4 Science

METR 140 Severe and Unusual Weather

Prerequisites: MATH 101 or higher; or a qualifying Math Placement Exam score for MATH 102 or 104 or higher.

Notes: METR 140 will not count toward the major in METR.

Description: Meteorological basics to help understand ice storms, blizzards, tornadoes, hurricanes, flooding, droughts, and other unusual weather.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

ACE: ACE 4 Science

METR 153 Introduction to Scientific Programming in Atmospheric Science

Prerequisites: METR 100

Notes: No prior programming experience is required.

Description: Introduction to problem solving with computers using MATLAB. Topics include language syntax, data types, program organization, problem-solving methods, and algorithm design and verification. Basics of problem solving with computers, and the skills necessary to analyze and visualize geophysical data sets.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 9

Format: LEC

Offered: SPRING

METR 180 Environment, Energy, and Climate Change

Description: Conceptual process of climate change, environmental quality and earth energy.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

ACE: ACE 4 Science

METR 205 Introduction to Atmospheric Science

Prerequisites: MATH 106; METR 100; PHYS 211 or 211H.

Description: Conceptual foundations for synoptic and dynamic meteorology. Meteorological data analysis, the dynamics of atmospheric motions, and atmospheric thermodynamics.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

Prerequisite for: METR 223; METR 311; METR 323

METR 223 Atmospheric Thermodynamics

Prerequisites: CSCE 155N; METR 205; MATH 107 or parallel.

Description: Basic thermodynamic concepts relevant to atmospheric processes, atmospheric stability, and cloud and precipitation micro-physics.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

Prerequisite for: METR 341

METR 270 Introduction to Climatology

Prerequisites: METR 100 or GEOL 101

Description: Introduction to the components of Earth climate system and the dynamic interactions between them. Topics include spatial and temporal variations in Earth climate, and how observations, models, and theory are used to make predictions about the future climate. Explore the impact of human activities on the global climate.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: FALL

METR 291 Special Topics in Meteorology

Prerequisites: Permission

Description: Topics vary.

Credit Hours: 1-12

Min credits per semester: 1

Max credits per semester: 12

Max credits per degree: 12

Format: LEC

METR 311 Dynamic Meteorology I

Prerequisites: CSCE 155N; MATH 208/208H; METR 205; PHYS 211/211H

Description: Equations of thermodynamics, momentum, and continuity are derived and applied to atmospheric motion. Energy conservation, flows, and conversions.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Prerequisite for: METR 312

METR 312 Dynamic Meteorology II

Prerequisites: METR 311; MATH 221/821.

Description: Applications of the principles of dynamic meteorology to the problems of forecasting and meteorological problems.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Offered: FALL/SPR

METR 323 Physical Meteorology

Prerequisites: CSCE 155N; METR 205; PHYS 212/212H

Description: Physical principles that provide the foundation for meteorology. Absorption, scattering, and transmission of radiation in the atmosphere, atmospheric optics, atmospheric electricity, and lightning.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

Prerequisite for: METR 465, METR 865

METR 341 Synoptic Meteorology

Prerequisites: METR 223

Description: Dynamic and thermodynamic concepts and principles applied to synoptic-scale weather forecasting. Dynamics, energetics, structure, evolution, and motion of extra-tropical cyclones. Meteorological communications, interpretation and analysis of weather maps, and thermodynamic diagrams.

Credit Hours: 4

Max credits per semester: 4

Max credits per degree: 4

Format: LEC

METR 370 Basic and Applied Climatology

Crosslisted with: NRES 370

Prerequisites: METR 100.

Description: Processes that give rise to spatial and temporal differences in climate. Various interrelationships between humans and climate. Influence of climate on building styles, the economy, water resources, human health, and society. Humans' inadvertent and purposeful modification of the atmosphere.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

METR 399 Independent Study

Prerequisites: Permission.

Credit Hours: 1-24

Min credits per semester: 1

Max credits per semester: 24

Max credits per degree: 24

Format: IND

METR 399H Honors Course

Prerequisites: Permission.

Credit Hours: 1-4

Min credits per semester: 1

Max credits per semester: 4

Max credits per degree: 4

Format: IND

METR 408 Microclimate: The Biological Environment

Crosslisted with: AGRO 408, GEOG 408, HORT 408, NRES 408, WATS 408, AGRO 808, GEOG 808, HORT 808, METR 808, NRES 808

Prerequisites: Junior standing, MATH 106 or equivalent, 5 hrs physics, major in any of the physical or biological sciences or engineering.

Description: Physical factors that create the biological environment.

Radiation and energy balances of earth's surfaces, terrestrial and marine. Temperature, humidity, and wind regimes near the surface. Control of the physical environment through irrigation, windbreaks, frost protection, manipulation of light, and radiation. Applications to air pollution research. Instruments for measuring environmental conditions and remote sensing of the environment.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

Prerequisite for: AGRO 907, HORT 907, METR 907, NRES 907; BSEN 954, NRES 954

Groups: Physical Geography

METR 415 General Circulation of the Atmosphere

Crosslisted with: METR 815

Prerequisites: Junior standing; METR 475/875; PHYS 211/211H; and PHYS 221.

Description: Development of the atmospheric circulation regimes, from planetary scale (e.g., the planetary waves) to synoptic scale (e.g., the cyclones and anticyclones) and mesoscale, their seasonal variations, and their roles in horizontal vertical energy and water transport and budgets in the Earth system.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

METR 421 Cloud Physics

Crosslisted with: METR 821

Prerequisites: METR 223 and METR 323 or equivalent

Description: Buoyancy and parcel mixing, cloud physics instrumentation, the role of aerosols in precipitation processes, growth of liquid cloud droplets/raindrops/ice crystals, processes associated with falling precipitation particles, drop size distributions and their moments, applications to convection, and parameterizations of cloud microphysical processes for numerical modeling applications.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

METR 428 Air Pollution

Crosslisted with: METR 828

Prerequisites: 6 hrs METR; CHEM 109

Description: Basic processes (e.g., emission, transport, first-order chemical reaction, and deposition) associated with air pollution and their combination with meteorology for air quality forecasting. Environmental topics: acid rain; smog; air pollution; ozone hole; greenhouse gases; aerosols; long-range transport; civic regulations and international treaties on air pollution; and climate change.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

METR 433 Boundary-layer Meteorology**Crosslisted with:** METR 833**Prerequisites:** METR 223 and MATH 208/208H**Description:** Basic concepts of atmospheric turbulence and fundamental dynamics, thermodynamics, and structure of the atmospheric boundary layer are discussed. Atmospheric boundary layer parameterizations used in modern weather and climate models are presented.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** METR 933**METR 442 Advanced Synoptic Meteorology-Climatology****Crosslisted with:** METR 842**Prerequisites:** METR 341.**Description:** Analysis and forecasting of subsynoptic-scale weather systems. Convection, thunderstorm models, severe local storm forecasting techniques, mesoscale convective complexes, vertical cross-sections, isentropic analysis, and weather radar.**Credit Hours:** 4**Max credits per semester:** 4**Max credits per degree:** 4**Format:** LEC**Prerequisite for:** METR 944**ACE:** ACE 10 Integrated Product**METR 443 Severe Storms Meteorology-Climatology****Crosslisted with:** METR 843**Prerequisites:** METR 311, METR 341 or parallel**Description:** Dynamics of various types of severe weather (blizzards, flash floods, lightning, thunderstorms and winter and summer tornado outbreaks). Interpretation of the numerical and statistical models utilized to forecast these phenomena. Synoptic case studies of severe weather occurrences. Recent research on severe weather.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**METR 444 Mesoscale Meteorology****Crosslisted with:** METR 844**Prerequisites:** METR 311**Description:** Dynamics and conceptual models of mesoscale meteorological phenomena and processes.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**METR 446 Broadcast Meteorology****Prerequisites:** METR 100**Notes:** Only 3 hours of credit from METR 446 or METR 447 may be applied to the major and/or minor in Meteorology through Group B requirements.**Description:** Information about the history and current status of broadcast meteorology and related technology. Procedures and requirements to obtain Professional Society certification/seal in Broadcast Meteorology. Address on air requirements mandated by the Federal FCC rules and regulations and social impacts of broadcast meteorology. Opportunity to gain experience in presenting weather information through various media outlets, including the use of chromakey technology and social media.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**METR 447 Broadcast Meteorology Practicum****Prerequisites:** Permission.**Notes:** Only 3 hours of credit from METR 446 or METR 447 may be applied to the major and/or minor in Meteorology through Group B requirements.**Description:** Produce weather presentations worthy of airing live during Star City News. Learn how to develop weather presentations for production, including development of graphics, lead ins and promos. One-on-one critiquing/coaching to improve the presentation and content of the presentation will also take place throughout the semester.**Credit Hours:** 1-3**Min credits per semester:** 1**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**METR 450 Climate and Society****Crosslisted with:** AGRO 450, GEOG 450, NRES 452, AGRO 850, GEOG 850, METR 850, NRES 852**Prerequisites:** Junior standing or above.**Notes:** Offered spring semester of even-numbered calendar years.**Description:** Impact of climate and extreme climatic events on society and societal responses to those events. Global in scope and interdisciplinary.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Offered:** SPRING**Groups:** Physical Geography**METR 454 Statistical Analysis of Atmospheric Data****Crosslisted with:** METR 854**Prerequisites:** 6 hrs METR and MATH 107/107H.**Description:** Application of univariate statistics, hypothesis testing, statistical forecasting, forecast verification, time-series analysis, principal component analysis, and cluster/multivariate analysis to atmospheric data for different applications in the atmospheric sciences (from short-term weather forecast to long-term climate prediction).**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** METR 965

METR 463 Radar Meteorology**Crosslisted with:** METR 863**Prerequisites:** METR 323.**Description:** The fundamental principles of weather radars and the basic application of these principles.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**METR 464 Satellite Meteorology****Crosslisted with:** METR 864**Prerequisites:** METR 223**Description:** Concepts and principles related to meteorological observations from satellites. Applications for weather analysis and forecasting.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**METR 465 Satellite Remote Sensing of Atmosphere****Crosslisted with:** METR 865**Prerequisites:** METR 323**Description:** Principles of atmospheric radiation and techniques for satellite image processing. Application of data calibration, image registration and enhancement, noise filtering and multi-spectral classification of satellite images. Survey of various satellite sensors used for monitoring different atmospheric processes and constituents.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**METR 469 Bio-Atmospheric Instrumentation****Crosslisted with:** AGRO 469, GEOG 469, HORT 407, MSYM 469, NRES 469, AGRO 869, GEOG 869, HORT 807, METR 869, MSYM 869, NRES 869**Prerequisites:** Junior standing; MATH 106; 4 hrs physics; physical or biological science major.**Description:** Discussion and practical application of principles and practices of measuring meteorological and related variables near the earth's surface including temperature, humidity, precipitation, pressure, radiation and wind. Performance characteristics of sensors and modern data collection methods are discussed and evaluated.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Groups:** Physical Geography**METR 470 The Climate System: Analysis and Prediction****Crosslisted with:** METR 870**Description:** Maintenance of the climate system and climate change over time. Global budgets of energy, water, and momentum and their balance. Development of simple, physically-based models of climate and of climate change.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**ACE:** ACE 10 Integrated Product**METR 471 Tropical Meteorology****Crosslisted with:** METR 871**Prerequisites:** METR 223 and METR 311**Description:** Atmospheric phenomena unique to the tropics, and their connection to the global circulation.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**METR 475 Physical Climatology****Crosslisted with:** METR 875**Prerequisites:** METR 205.**Description:** Global energy and water balance regimes of the earth and its atmosphere. Utilization of physical laws to reveal causes and effects of interrelationships in the climatic system.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**Prerequisite for:** METR 483, METR 883, NRES 467, NRES 867; MUSC 94, MUSC 494, MUSC 894**METR 478 Regional Climatology****Crosslisted with:** METR 878, NRES 478, NRES 878**Prerequisites:** NRES/METR 370.**Description:** Regional differentiation of the climates of the earth on both a descriptive and dynamic basis. The chief systems of climatic classification.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**METR 479 Hydroclimatology****Crosslisted with:** NRES 479, WATS 479, BSEN 479, NRES 879, METR 879, BSEN 879**Prerequisites:** NRES 208 or METR 100 or METR/NRES 370.**Notes:** Offered spring semester of even-numbered calendar years.**Description:** Interaction between earth's climate and the hydrologic cycle. Energy and water fluxes at the land-atmosphere interface. Atmospheric moisture transport, precipitation, evaporation, snowmelt, and runoff. Impacts of climate variability and change on the hydrologic cycle.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC**METR 483 Global Climate Change****Crosslisted with:** METR 883, NRES 467, NRES 867**Prerequisites:** Junior standing; and METR 475/875.**Notes:** Offered fall semester of even-numbered calendar years.**Description:** Elements of climate systems, El Nino/La Nina cycle and monsoons, natural variability of climate on interannual and interdecadal scales. Paleoclimate, and future climate, developed climate change scenarios and climate change impacts on natural resources and the environment.**Credit Hours:** 3**Max credits per semester:** 3**Max credits per degree:** 3**Format:** LEC

METR 487 Earth's Climate: Past, Present, Future

Crosslisted with: METR 887

Prerequisites: 6 hrs METR or 6 hrs GEOL.

Description: How the Earth's climate has varied and the forcing mechanisms related to those changes. Themes that reappear through Earth's climate history and into the future; causes of climate change; the natural response times of the multiple components; and the role of greenhouse gases within the climate system at differing time scales.

Credit Hours: 3

Max credits per semester: 3

Max credits per degree: 3

Format: LEC

METR 495 Internship in Meteorology-Climatology

Crosslisted with: METR 895

Prerequisites: Permission.

Description: Application of meteorology-climatology learning with on-the-job training.

Credit Hours: 1-6

Min credits per semester: 1

Max credits per semester: 6

Max credits per degree: 6

Format: FLD

METR 498 Special Topics in Meteorology-Climatology

Crosslisted with: METR 898

Prerequisites: Permission.

Credit Hours: 1-24

Min credits per semester: 1

Max credits per semester: 24

Max credits per degree: 24

Format: LEC

METR 499 Independent Study

Prerequisites: Permission.

Credit Hours: 1-24

Min credits per semester: 1

Max credits per semester: 24

Max credits per degree: 24

Format: IND

METR 499H Honors Course

Prerequisites: Permission.

Credit Hours: 1-4

Min credits per semester: 1

Max credits per semester: 4

Max credits per degree: 4

Format: IND