

Fall Even Course Offerings

Core Courses

ATMO 541A Dynamic Meteorology I

Description: Thermodynamics and its application to planetary atmospheres, hydrostatics, fundamental concepts and laws of dynamic meteorology. Graduate-level requirements include a more quantitative and thorough understanding of the subject matter.

Units: 3.00

Typically Offered: *Fall*

Cross listed: PTYS 541A

ATMO 551A Physical Meteorology I

Description: Introduction to atmospheric physics that includes the composition and chemistry of the atmosphere, kinetic theory, the mechanics of ideal and real fluids, aerosol mechanics, atmospheric acoustics, atmospheric radiation, scattering, radiative transfer, atmospheric optics, cloud physics, and atmospheric electricity. Graduate-level requirements include a more quantitative and thorough understanding of the subject matter.

Units: 3.00

Typically Offered: *Fall*

ATMO 596A Progress in Atmospheric Sciences* (Seminar)

Description: This is a seminar course that all graduate students are required to take each academic semester. The course consists of invited speakers that will overview progress in different sub-disciplines.

Units: 1.00

Typically Offered: *Fall, Spring*

*Students in the atmospheric sciences programs are required to register for a minimum of 2.00 units or 2 semesters.

Electives

ATMO 569A Air Pollution I: Gases

Description: An introduction to the chemistry and physics of the troposphere and stratosphere. Topics include natural biogeochemical cycles; atmospheric photochemistry; stratospheric ozone; urban ozone and particulate matter; atmospheric visibility; acid deposition; air pollution meteorology; Gaussian plume model; photochemical model; air quality regulations. Graduate-level requirements include additional homework and other exercises.

Units: 3.00

Typically Offered: *Fall*

Cross listed: CHEE 569A

ATMO 572 Weather Analysis and Forecasting

Description: Advanced analysis techniques. Principles of weather forecasting and actual forecasting experience. Graduate-level requirements include a survey paper on some aspect of weather prediction.

Units: 1.00

Typically Offered: *Fall Even (2014, 2016, 2018)*

ATMO 590 Remote Sensing for the Study of Planet Earth

Description: A multidisciplinary course delineating the physical basis of electromagnetic remote sensing, the concepts of information extraction, and applications pertinent to earth systems science. Graduate-level requirements include an additional term paper.

Units: 3.00

Typically Offered: *Fall Even (2014, 2016, 2018)*

Home Department: Remote Sensing & Spatial Analysis, Cmt

Cross listed: REM 590, ARL 590, GEOG 590, GEOS 590, HWRS 590, MNE 590, OPTI 590, RNR 590, SWES 590

ATMO 641 Advanced Atmospheric and Oceanic Fluid Dynamics

Description: Fundamentals and theory of the large-scale circulation of the atmosphere and oceans. Hierarchy of equation sets used in geophysical fluid dynamics. Concepts of balance, vorticity, potential vorticity. Barotropic and baroclinic instability. Wave mean-flow interactions. Atmosphere/ocean turbulence. Dynamics of Hadley cells and jet streams; role of Rossby waves, gravity waves, and baroclinic eddies in helping to maintaining the mean flow. Application of this theory to understand the fundamental mechanisms controlling the tropospheric and stratospheric circulation of the Earth and other planets. Basics of oceanic circulation, including wind-driven gyres, buoyancy-driven (overturning) circulation, and thermocline dynamics.

Units: 3.00

Typically Offered: *Fall Even (2014, 2016, 2018)*

Cross listed: PTYS 641

Course Requisites: Students must have familiarity with calculus, differential equations, and basic atmospheric dynamics at the level of ATMO 541A or equivalent.

ATMO 656A Atmospheric Radiation and Remote Sensing

Description: Theory of atmospheric radiative transfer processes; specific methods for solving the relevant equations; applications to problems in radiative transfer; theoretical basis for remote sensing from the ground and from space; solutions to the "inverse" problem.

Units: 3.00

Typically Offered: *Fall Even (2014, 2016, 2018)*

Cross listed: OPTI 656A, PTYS 656A

Course Requisites: MATH 254

GEOG 539A Introduction to Dendrochronology

Description: Survey of dendrochronological theory and methods. Applications to archaeological, geological, and biological dating problems and paleoenvironmental reconstruction. Emphasis on dating methods, developing tree-ring chronologies, and evaluating

tree-ring dates from various contexts. Graduate-level requirements include a research paper reviewing critically some aspect of dendrochronology.

Units: 4.00

Typically Offered: *Fall*

Home Department: Geosciences

Cross listed: GEOS 539A, ANTH 539A, WSM 539A

GEOS 578 Global Change

Description: Analysis of the Earth system through an examination of its component parts (particularly climate and biogeochemistry) and their interactions with human activities, emphasizing information needed to understand modern and future environmental changes. Graduate-level requirements include an in-depth written exercise and additional activities as described in the syllabus.

Units: 3.00

Typically Offered: *Fall*

Home Department: Geosciences

Cross listed: ECOL 578, GC 578, GEOG 578, HWRS 578, RNR 578, SW578

GEOS 579 Introduction to Climate Dynamics

Description: The course will cover the interactions between the different components of the climate system including the atmosphere, ocean, sea/land ice, etc., and the dominant feedbacks so that students can understand the working of the climate system and the mechanisms governing its variability and response to external perturbations. Graduate-level requirements include a final paper and presentation. The students choose the topics with the help of instructors, which maybe related to their dissertation research.

Units: 3.00

Typically Offered: *Fall*

Home Department: Geosciences

Cross listed: ATMO 579, HWRS 579, SWES 579, WSM 579

Course Requisites: MATH 124

HWRS 543A Risk Assessment in Environmental Systems

Description: A multidisciplinary course based on evaluating risk as the loss expected from environmental catastrophes or from the failure of systems designed for environmental protection. Examples will be drawn from hydrology, atmospheric science, and geology. The emphasis is on adapting the tools of probabilistic risk assessment to environmental analyses. Graduate-level requirements include a written review of a seminal paper and its presentation in class.

Units: 3.00

Typically Offered: *Fall*

Home Department: Hydrology & Water Resources

RNR 527 Earth's Changing Carbon Cycle

Description: This class investigates the natural and human influences on the global carbon cycle. With a focus on natural ecosystems, students examine the key elements of the carbon cycle, the processes controlling them and environmental consequences of curbing rising

atmospheric carbon. Graduate-level requirements include selecting a personal study topic relevant to their research interests, 5-10 minute presentation on their essay topic, complete several reading assignment and an associated short activity to be completed online.

Units: 3.00

Typically Offered: *Fall Even (2014, 2016, 2018)*

Home Department: Renewable Natural Resources

WSM 560A Watershed Hydrology

Description: Watershed hydrology looks at how water movement, storage and transformation on the Earth's surface is influenced by landscape characteristics, including human modifications of those characteristics, and weather. As such, watershed hydrology will focus on surface water. However, this course offers a brief introduction to groundwater as it pertains to watershed hydrology. Graduate-level requirement includes required completion of a graduate environmental inquiry through volunteer work. Graduate students will be required to blog about these experiences.

Units: 4.00

Typically Offered: *Fall*

Home Department: Watershed Hydrology

Cross listed: HWRS 560A

Course Requisites: Calculus and PHYS 102 or equivalent.

Independent Study, Research, Thesis, Dissertation

ATMO 599 Independent Study

Description: Qualified students working on an individual basis with professors who have agreed to supervise such work. Graduate students doing independent work which cannot be classified as actual research will register for credit under course number 599, 699, or 799.

Units: 1.00-6.00

Typically Offered: *Fall, Spring, Summer*

ATMO 900 Research

Description: Individual research, not related to thesis or dissertation preparation, by graduate students.

Units: 1.00-6.00

Typically Offered: *Fall, Spring, Summer*

ATMO 910 Thesis

Description: Research for the master's thesis (whether library research, laboratory or field observation or research, artistic creation, or thesis writing). Maximum total credit permitted varies with the major department.

Units: 1.00-6.00

Typically Offered: *Fall, Spring, Summer*

ATMO 920 Dissertation

Description: Research for the doctoral dissertation (whether library research, laboratory or field observation or research, artistic creation, or dissertation writing).

Units: 1.00-9.00

Typically Offered: *Fall, Spring, Summer*