Fall Odd 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 529 Objective Analysis in the Atmospheric and Related Sciences
Description: This graduate course provides an overview of statistical methods used to interpret datasets in the atmospheric and related sciences. The objective is to provide a working knowledge of the statistical tools most commonly used. Topics include application of basic statistics (composite analysis; significance testing; curve fitting; regression analysis; correlation; and non-normal distributions), non-parametric statistical significance testing (e.g. Monte-Carlo methods and field significance), matrix methods (principal component analysis; SVD analysis; CCA), and time series analysis (harmonic analysis; power spectra; data filtering; cross-spectrum analysis; singular spectrum analysis; and wavelet analysis).
Units: 3.00
Typically Offered: *Fall Odd (2013, 2015, 2017)*
Cross listed: GEOG 529, HWRS 529, GEOS 529

ATMO 537 The Physics of Sun

Description: The purpose of this course is to present an introduction to the physics of the Sun. The course begins with a discussion of the standard solar model, the solar-neutrino problem, and observational techniques. Long-term variability in the total irradiance, sunspot number, and diameter, and its effect on Earth's climate will be addressed in some detail. Other topics include the physics of the solar interior, solar oscillations, and solar composition. This course will also introduce the equations of magnetohydrodynamics and apply them to important solar-physics problems, such as: the solar magnetic dynamo, stability of prominences, physics of sunspots and flares, and heating of the solar atmosphere. The emphasis throughout will be on basic physical processes and the various approximations used in their application to concrete problems.
Units: 3.00
Typically Offered: *Fall Odd (2013, 2015, 2017)*
Home Department: Planetary Sciences
Cross listed: PTYS 537, PHYS 537, ASTR 537

ATMO 545 Introduction to Data Assimilation

Description: Data assimilation (DA) involves combining information from observations and models of a particular physical system in order to best define and understand the evolving state of the system. It is currently applied across a wide range of Earth sciences, including weather forecasting, oceanography, atmospheric chemistry, hydrology, and climate studies. This course provides an introduction to the theory and applications of DA in atmospheric and related sciences. Topics include common DA methods like optimal interpolation, Kalman filtering and variational schemes within the context of estimation theory. The course is designed as a hands-on approach to key DA concepts that are currently used today.
Units: 3.00
Typically Offered: *Fall Odd (2013, 2015, 2017)*
Cross listed: HWRS 545
Course Requisites: Linear algebra, elementary statistics. Basic programming skills (C, Fortran, Matlab) is needed or consent of instructor.

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 577 Topics in Applied Mathematics

Description: Advanced topics in asymptotics, numerical analysis, approximation theory, mathematical theory of mechanics, dynamical systems, differential equations and inequalities, mathematical theory of statistics; content varies.
Units: 3.00
Typically Offered: *Fall Odd (2013, 2015, 2017)*

Home Department: Mathematics
Cross listed: MATH 577

ATMO 580 Tropical Meteorology
Description: An introduction to fundamentals of meteorology in the tropics. Topics include atmospheric processes in the tropics; mass, heat, energy, momentum, and water vapor budgets, cumulus convection, hurricanes and other disturbances.
Units: 3.00
Typically Offered: *Fall Odd (2013, 2015, 2017)*
Course Requisites: ATMO 536A, ATMO 541A or consent of instructor

GC 572 Global Biogeochemical Cycles
Description: Study of processes affecting global chemical fluxes. Particular attention to current global concerns, i.e., ozone hole, carbon cycle, climate warming, atmospheric oxidation, hydrologic cycle.
Units: 3.00
Typically Offered: *Fall Odd (2013, 2015, 2017)*
Home Department: Global Change
Cross listed: GEOS 572, HWRS 572

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 567 Inverse Problems in Geophysics
Description: Linear and nonlinear inverse theory, including least squares, generalized and maximum likelihood methods.
Units: 3.00
Typically Offered: *Fall Odd (2013, 2015, 2017)*
Home Department: Geosciences
Cross listed: ATMO 567, PTYS 567
Course Requisites: Experience with linear algebra recommended.

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

GEOS 582 Paleoclimatology
Description: Topics in paleoclimatology including prediction of paleoclimatic patterns, proxy paleoclimatic indicators, and paleoclimatic cycles. Graduate-level requirements include an additional research project.
Units: 3.00
Typically Offered: *Fall Odd (2013, 2015, 2017)*
Home Department: Geosciences

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

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*