ESCI 110: 2 s.h.
Introduction to Earth Sciences Programs
General introduction to each of the earth sciences disciplines and to college life. 2 hrs. lec. Offered in fall. Restricted to earth sciences majors.

ESCI 322: 3 s.h.
Environmental Hydrology
Theory and practice of quantifying hydrologic phenomena; field methods, data manipulation and environmental applications. 2 hrs. lec., 2hrs. lab.
Prereq: C- grade or higher in ESCI 221, ESCI 241or GEOG 230 and MATH 160.

ESCI 241: 4 s.h.
Meteorology (G2, L)
Atmospheric structure and motions; physics of weather processes; weather and motion systems. 3 hrs. lec., 2 hrs. lab. Offered in fall and in spring as
needed. Coreq or Prereq: MATH 161 or 163, and PHYS 131 or PHYS 231.

ESCI 340: 3 s.h.
Physical Meteorology
Distribution of meteorological variables in the atmosphere; governing principles in atmospheric science (gas laws, hydrostatic equilibrium, diffusion,
conservation of energy, mass and momentum); radiative transfer, cloud processes and atmospheric electrification. 3 hrs. lec. Offered in spring.
Prereq: ESCI 241 or PHYS 231. Coreq or Prereq: MATH 311.

ESCI 341: 3 s.h.
Atmospheric Thermodynamics
First and second principles of thermodynamics, water-air systems, equilibrium of small droplets and crystals, thermodynamic processes in the atmosphere,
atmospheric statics, vertical stability and aerological diagrams. 3 hrs. lec. Offered in fall. Prereq: ESCI 241. Coreq or Prereq: MATH 311.
ESCI 342 3 s.h.

ESCI 342: 3 s.h.
Atmospheric Dynamics I
Meteorological coordinate systems; equations of motion; geostrophic, gradient and thermal winds; kinematics; circulation, vorticity and divergence
theorems. 3 hrs. lec. Offered in fall. Prereq: ESCI 241. Coreq or Prereq: MATH 311.

ESCI 343: 3 s.h.
Atmospheric Dynamics II
Diagnostics equations, viscosity and turbulence; energy equations and transformations; numerical weather prediction; general circulation. 3 hrs.
lec. Offered in spring. Prereq: ESCI 342.
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ESCI 344: 3 s.h.
Tropical Meteorology
General circulation of the tropics; energy balance; boundary layer; cumulus convection; survey of tropical disturbances including tropical cyclones.
3 hrs. lec. Offered in fall of odd years. Prereq: ESCI 341, 342.

ESCI 347: 3 s.h. (G2)
Satellite Meteorology
Theory of weather satellites including orbital characteristics and signal receipt, synoptic weather interpretation, mesoscale features, precipitation

signatures, fog, wind shear, tropical weather systems. Offered in fall of even years. Prereq: ESCI 241; MATH 161 or MATH 163.

ESCI 348: 1 s.h.
Broadcast Meteorology
Preparation and presentation of weather information to the public; graphics preparation, television and radio weathercasting; video production. 2
hr. lec. Offered in spring. Prereq: ESCI 241 or COMM 320.

ESCI 349: 3 s.h.
Chemistry of the Atmosphere (P)
Theory, application, methods of analysis and instrumentation relevant to a study of the chemistry of the atmosphere. 3 hrs. of integrated lecture/lab/
working group activities. May be used as an elective in meteorology and environmental chemistry if not counted as "P" course. Prereq: Minimum
of 36 credit hours, which must include 24 credit hours of liberal arts core courses; ENGL 110; CHEM 104 or CHEM 111; and PHYS 132 or PHYS
232. Offered in spring of odd years.

ESCI 350: 3 s.h.
History of Meteorology (P)
Overall intellectual and institutional development of meteorology from Aristotle to present with emphasis on the 20th century. Historical overviews
of dynamic meteorology and numerical weather prediction, observational tools (history of radar and satellites) and computational devices, cloud
microphysics and dynamics, hurricanes, convective storms and climatology. Spotlight key scientists and their role in the advancement of atmospheric
sciences. 3 hrs. lec. Prereq: ESCI 107, 109, or ESCI 241; and HIST 101or 102 or 106, or 340; and ENGL 110.

ESCI 440: 3 s.h.
Space Weather and Environment
In-depth study of the space environment between earth and sun; solar-terrestrial interactions; physics of the sun and space weather; observations,
modeling, and prediction of space weather events; effects on life, property, and infrastructure. 3hrs. lec. Co-req: MATH 365; Prereq: ESCI 342, and
either ESCI 340 or PHYS 233; or permission of the instructor. Offered in spring of even years.

ESCI 441: 3 s.h.
Synoptic Meteorology Lecture-Laboratory I
Dynamics and physics of the atmosphere as revealed by observational data and numerical output; subjective and objective analysis of meteorological
data; use of standard meteorological graphics software; current weather discussions. 2 hrs. lec., 4 hrs. lab. Offered in fall. Prereq: ESCI 342.

ESCI 442: 3 s.h.
Synoptic Meteorology Lecture-Laboratory II
Weather forecasting concepts with focus on numerical weather prediction; forecasting of severe convective storms; current weather discussion. 2
hrs. lec., 4 hrs. lab. Offered periodically in spring. Prereq: ESCI 441.

ESCI 443: 3 s.h.
Climate Dynamics
A comprehensive treatment of the components of the climate system, feedback mechanisms and interactions; mean state of the climate system;
a detailed and in-depth treatment of the earth-atmosphere radiation balance and general circulation; natural and anthropogenic forcings and their

effect on the climate system; climate models; and the current state of climate observing networks and model validation. 2 hrs. lec.; 2 hrs. applications
and analysis. Offered in spring. Prereq: ESCI 343 or ESCI 364.

ESCI 444: 4 s.h.
Meso- and Storm-Scale Meteorology
Study of high-impact events that threaten life and property. Microphysical and dynamic aspects of severe convective systems, mesoscale convective
complexes, squall lines, jet streaks, gravity waves, strong turbulence, damaging winds, hailstorms, tornadoes and flash flooding. 4 hrs. integrated
lec./lab. Offered in spring. Prereq: ESCI 441.

ESCI 445: 3 s.h.
Numerical Modeling of the Atmosphere and Oceans
Methods and mathematical concepts of numerical weather and ocean prediction models. Students must be able to program in one of the following
languages: Fortran, C++, or IDL. 3 hrs. lec. Offered in spring of odd-numbered years. Prereq: ESCI 282 or CSCI 161. Coreq or Prereq: ESCI
343 or ESCI 365.

ESCI 446: 3 s.h.
Statistical Meteorology
Frequency distributions, sampling theory, linear and multiple regression analysis, time series, space variations of meteorological variables, statistical
weather forecasting, forecast verification. 3 hrs. lec. Offered in fall. Prereq: MATH 235, MATH 311.

ESCI 447: 3 s.h.
Meteorological Instrumentation, Measurement, and Observing Systems (W)
Devices and platforms used to gather meteorological data; methods of data acquisition, reduction, error analysis and quality assurance; description of
instrumentation, measurement techniques, observing systems and their deployment. 2 hrs. lec., 2 hrs. lab. Offered in fall of odd years. Prereq: PHYS
232 and MATH 235.

ESCI 448: 3 s.h.
Boundary Layers and Turbulence
Mean boundary layer characteristics; turbulence and its spectrum; governing equations to turbulent flow; prognostic equations for turbulent fluxes
and variances; TKE; turbulence closure schemes; similarity theory; simulation techniques; convective and stable boundary layers; boundary layer
clouds. 3 hrs. lec. Offered in spring of even years. Prereq: ESCI 342 and MATH 211.

ESCI 449: 3 s.h.
Radar Meteorology
Algorithms used in the display and interpretation of weather radar data; theory of electromagnetic radiation, principles of radar operation, Doppler
radar and interpretation techniques; wind velocity, rainfall rates and detection of individual cells, multiple cells and turbulence. 3 hrs. lec. Offered
in spring of even years. Prereq: ESCI 241, MATH 311. Coreq or Prereq: ESCI 342.
Ocean Sciences and Coastal Studies

ESCI 261: 4 s.h.
Introduction to Oceanography (G2, L)
Methods and techniques of oceanography; physical, chemical, biological and geological aspects of the oceans; unity of oceanographic science

and its relationship to other environmental sciences. 3 hrs. lec., 2 hrs. lab. Overnight field trip required. Offered in fall, spring. Prereq: MATH 155,
MATH 160, MATH 161 or MATH 163.

ESCI 364 or MAR. SCI. 364: 3 s.h.
Descriptive Physical Oceanography
Physical properties of seawater; mass and energy budgets of the ocean; typical distribution of water characteristics; dynamic computation of current;
circulation and water masses of the ocean; nature of waves and tides; basic instrumentation in field work. 2 hrs. lec., 2 hrs. lab. Offered in fall
of even years. Prereq: ESCI 261 and PHYS 232 or 132

ESCI 365: 3 s.h.
Dynamical Physical Oceanography
Fluid motion in rotating systems; principal balance and modifications; conservation of vorticity; quasi-geostrophy; wind-driven and thermohaline
circulation; currents and eddies; classical tidal theory; generation and propagation of surface waves. 2 hrs. lec., 2 hrs. lab. Offered periodically.
Prereq: ESCI 364. Coreq or Prereq: MATH 365 and PHYS 312.

ESCI 281: 3 s.h.
GIS Applications for the Earth Sciences
Introduction to the basic concepts of geospatial information systems applications for earth sciences students. Emphasis is on the use of GIS
applications for solving problems in the earth sciences. Limited to earth sciences majors or minors who have completed one of the introductory
earth sciences courses for majors. ESCI 281 and GEOG 295 may not both be taken for credit. 3 hrs. lec. Offered in fall of even years. Prereq: ESCI
221 or 241 or 261.

ESCI 282: 3 s.h.
FORTR AN Programming for Earth Sciences Applications
Programming in computational methods emphasizing FORTRAN applied to the earth sciences; numerical solution of equations of motion; statistical
properties of digital images; analysis of periodical phenomena; use of National Center for Atmospheric Research graphics library. 2 hrs. lec., 2
hrs. lab. Offered in fall. Prereq: MATH 211 and PHYS 231.

ESCI 380: 3 s.h.
Remote Sensing and Image Interpretation
Principles of remote sensing; fundamentals of image enhancement; radiative transfer equation; use of Landsat and NOAA environmental satellite
data in earth sciences; use of Environment for Visualizing Images (ENVI) software for image analysis and interpretation. Basic computer literacy is
assumed. 2 hrs. lec., 2 hrs. lab. Research project is required. Offered periodically.

ESCI 386: 3 s.h.
IDL Programming for Advanced Earth Sciences Applications
Overview of existing global data sets in geology, meteorology, and oceanography; HDF and Net CDF scientific data formats; use of Interactive Data
Language (IDL) to analyze and display data. 2 hrs. lec., 2 hrs. lab. Offered in spring. Prereq: ESCI 282, MATH 211 and PHYS 231.

ESCI 485: 3 s.h.
Air/Sea Interaction

Physics of wind waves; turbulent fluxes at the air-sea interface; planetary boundary layers; low-frequency oceanic waves; storm surges; importance
of the ocean for tropical climates; El-Niño-Southern Oscillation, monsoon circulations, tropical and extratropical cyclones. 3 hrs. lec. Offered in
spring of even years. Prereq: ESCI 342 or 364.
Problems and Seminar

ESCI 390: 1-4 s.h.
Topics in the Earth Sciences
Detailed investigation of a topic of current research interest. Topic to be announced each time course is offered. Credit and meeting hours variable,
depending on topic offered. Offered infrequently. Prereq: completion of 60 credits.

ESCI 497: 1 s.h.
Seminar in the Earth Sciences
The interrelationships of the earth sciences disciplines as environmental sciences, viewed in the context of contemporary science. Offered infrequently.
Prereq: completion of 60 credits.

ESCI 498: 1-3 s.h.
Independent Study in the Earth Sciences
Supervised independent research in the earth sciences. Subject determined jointly by student and the problem supervisor. Permission of department
chair and school dean required.