ERTH - Earth Systems

ERTH 101IN  Earth System Sciences: 4 Credits (3 Lec, 1 Lab)
Examination of basic geologic processes, Earth and planets through geologic time, internal geosystems, and surficial geosystems.

ERTH 201INN Honors Earth System Science: 4 Credits (4 Lec)
PREREQUISITE: Enrollment in the MSU Honors Program. This Honors course explores the complex interactions occurring at all scales between the Earth’s geosphere, biosphere, hydrosphere, atmosphere, and anthroposphere. The goal of the course is to understand the Earth as a “system” of interconnected sources of energy through deep geologic time and space.

ERTH 212RN Yellowstone: Scientific Lab: 4 Credits (3 Lec, 1 Other)
The Yellowstone region is an unparalleled laboratory for earth scientists. The volcanic, glacial, climatic, and ecological processes that shaped the region will be introduced through lecture, discussions, and projects. Recitation sections and field trips provide additional hands-on experiences. -.

ERTH 303 Weather and Climate: 3 Credits (3 Lec)
PREREQUISITE: ERTH 101IN or ERTH 201IN. The climates of the continents, and their classification, characteristics and interrelationships with other factors of the physical and human environment.

ERTH 307 Principles of Geomorphology: 4 Credits (3 Lec, 1 Lab)
PREREQUISITE: ERTH 101IN or ERTH 201IN and GPHY 284. Framework, process, system, and time as factors which control the generation of land forms. Laboratories involve field trips and map interpretation, and computer modeling.

ERTH 422R Surface Water Resources: 3 Credits (2 Lec, 2 Lab)
PREREQUISITE: Junior Standing, ERTH 101IN and STAT 216Q or STAT 332 and PHSX 205 or PHSX 220. Physical analysis of the surface portion of the hydrologic cycle: climate, evapotranspiration, precipitation, runoff, flooding, stream channels, sediment production, sediment transport and drainage basins. The surface-water resource in terms of regional supply and human use and intervention. Laboratory fee required.

ERTH 450R  Snow Dynamics and Accumulation: 4 Credits (1 Lec, 3 Lab)
PREREQUISITE: ERTH 101IN or ERTH 201IN, STAT 216Q or STAT 332, PHSX 205 or PHSX 220, ACT 160 (or equivalent). Ability to Ski/Board at intermediate level in back country alpine terrain. Junior or Senior standing: STAT 216Q, PHSX 205 or PHSX 220, ERTH 101IN, ACT 160 (or equivalent), or consent of instructor. Senior capstone for the Snow Science Option. The accumulation, redistribution, and metamorphism of snow as related to humans. Avalanche, recreation, agriculture, silviculture, runoff, and the alpine environment. Field studies are conducted on a regular basis under rigorous field conditions.

ERTH 484 Climates of the Past, Present and Future: 3 Credits (3 Lec)
PREREQUISITE: ERTH 101IN and Junior standing. This course is an opportunity to learn about the history of the western US over the last 2 million years through a critical analysis of current and historic literature. It will provide an overview of the tools and approaches used to study past environmental change, significant events in the climate history of region, the geologic record of ice-age environments, including glaciation, pluvial lakes, and vegetation, the evolution of the postglacial landscape, and important biotic and human events during the Holocene. Co-convened with ERTH 584.

ERTH 490R Undergraduate Research: 1-6 Credits (1 Other)
PREREQUISITE: Consent of instructor. Directed undergraduate research which may culminate in a research paper, journal article, or undergraduate thesis. Course will address responsible conduct of research. May be repeated. Repeatable up to 12 credits.

ERTH 491 Special Topics: 1-4 Credits (2-4 Lec, 4-8 Lab)
Repeatable up to 4 credits.

ERTH 494 Seminar: 1 Credits (1 Other)
PREREQUISITE: Consent of instructor. Topics at the upper division level not covered in regular courses. Students participate in preparing and presenting discussion material. Co-convened with ERTH 594.

ERTH 498 Internship: 2-12 Credits (2-12 Other)
PREREQUISITE: Junior standing, consent of instructor, and approval of department head. An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field. Repeatable up to 12 credits.

ERTH 499 Senior Thesis/Capstone: 3 Credits (3 Other)
PREREQUISITE: Senior standing; minimum 3.0 cum gpa; faculty recommendation. Senior thesis provides an opportunity to conduct research under the supervision of a faculty member leading to the production of a research paper (“mini-thesis”) and an oral presentation to the department or at a professional meeting. Excellent preparation for graduate school and professional work.

ERTH 502 Fluvial Geomorphology: 3 Credits (3 Lec)
PREREQUISITE: ENTH 307 or other introduction to fluvial systems or instructor permission. This course provides a foundation for understanding fluvial processes, interpreting fluvial forms, and teaches basic tools for use in watershed and river assessment. Course will cover drainage networks, channel form, and apply these concepts to a river assessment problem.

ERTH 505 Geomicrobiology: 3 Credits (3 Other)
The course examines geochemical and microbial interactions that control earth surface processes and ultimately major biogeochemical cycles. The course focuses on how integrated approaches using geochemistry, stable isotope geochemistry, and microbial techniques are applied to research problems.

ERTH 512 Mtn & Plns Riparian Proc: 2 Credits (2 Lec, 2 Other)
PREREQUISITE: ERTH 101IN, secondary teaching certification plus two years teaching experience; recommended ERTH 516 and access to the world wide web. Riparian hydrologic and geomorphic processes with examples drawn from the mountains and plains. Ground-water recharge and discharge; Horton overland flow; partial variable runoff areas; riparian best management practices; sapping, types of springs; sediment from slopes. K-12 riparian science education.

ERTH 516 North Rocky Mtn Geology: 2 Credits (1 Lab, 1 Other)
Geologic history of Northern Rocky Mountains, and landscapes from Archean to present. Structural, tectonic, and surficial elements. Field examination of geologic evidence for history of the Gallatin Range, Bridger Range, and Yellowstone National Park. Exploration and development of teaching methods and resources for the K-12 classroom. Offered Summer.

ERTH 519 Watershed Hydrology for Teachers: 3 Credits (1 Lec, 1 Lab, 1 Other)
Watershed hydrology for teachers explores the relationship of water quantity and water quality. Students in the course will learn about relationships among watershed hydrology, including water quality, water quantity, water inputs and outputs, effects of modification of watersheds and more. Offered Spring.

ERTH 520 Fundamentals of Oceanography for Teachers: 3 Credits (3 Lec)
This course will provide students with an introduction to the chemical, physical, biological and geological properties of the ocean. Students will learn the complexities of these interrelationships, their influence on terrestrial ecosystems and the impacts of humans on these processes. Offered Spring.
Science of climate change. Offered Summer.

Science teachers at the upper middle to high school level, explores the is a complex subject that balances the physical record and scientific fact with pedagogical skills in teaching science in general and landform science in particular. Offered Summer.

PREREQUISITE: ERTH 527 or equivalent. The science of climate change

ERTH 528 Climate Change for Teachers: 3 Credits (3 Lec)

This graduate course uses weekly readings, discussions, and hands on activities to build a physical understanding of weather and climate, and to equip our teachers and educators with the tools to better prepare and motivate the next generation of Earth scientists. Offered Spring.

ERTH 528 Climate Change for Teachers: 3 Credits (3 Lec)

PREREQUISITE: ERTH 527 or equivalent. The science of climate change is a complex subject that balances the physical record and scientific fact with politics, policy, and ethics. This course, specially designed for practicing science teachers at the upper middle to high school level, explores the science of climate change. Offered Summer

PREREQUISITE: Graduate Standing; PHYS 211, STAT 332 or STAT 401; Interest in snow science. A mixed lecture and laboratory style course providing an in-depth examination of recent developments in snow science based upon current literature, newly published or about to be published literature, field methods and modeling regarding snow science. Topics will depend partially upon the interests of the instructor and student in the course

ERTH 562 Advanced Geomorphology: 3 Credits (3 Lec)

Repeatable up to 6 credits.

ERTH 581 Quaternary Paleoecology: 3 Credits (3 Other)

PREREQUISITE: ERTH 101IN or BIOB 170IN or equivalent. Course examines the history and development of modern biomes and the causes and consequences of long-term ecological change.

ERTH 583 Topics in Paleoecology: 3 Credits (3 Other)

PREREQUISITE: Graduate Standing or Consent of Instructor. Course examines important themes in paleoecology. Topics change on a yearly basis addressing needs and interests of current students. It is intended for students with an interest in ecology, paleontology and environmental history

ERTH 584 Climates of the Past, Present and Future: 3 Credits (3 Lec, 3 Other)

PREREQUISITE: ERTH 101IN or BIOB 170IN or equivalent. This graduate course examines current research and recent developments in Quaternary paleoclimatology in the western U.S. The seminar will be centered around weekly discussions of the primary literature, hands-on experience with international data bases, and class paper and presentation. Co-convened with ERTH 484

ERTH 585 Advances in Geobiology: 1 Credits (1 Other)

Discussion of recent developments in paleontology, paleoecology, biogeochemistry, and biogeography based on current literature and presentation of faculty and student works in progress. Repeatable up to 3 credits.

ERTH 588 Professional Development: 1-3 Credits (1-3 Lec)

PREREQUISITE: Graduate standing, teaching experience and/or current employment in a school organization, consent of instructor and Dean of Graduate Studies. Courses offered on a one-time basis to fulfill professional development needs of in service educators. A specific focus is given to each course which is appropriately subtitled. May be repeated Repeatable up to 3 credits.

ERTH 590 Master's Thesis: 1-10 Credits (1 Other)

PREREQUISITE: Master's standing Repeatable up to 99 credits.
ERTH 591 Special Topics: 1-4 Credits (1-4 Other)
PREREQUISITE: Upper division courses and others as determined for each offering. Courses not required in any curriculum for which there is a particular one time need, or given on a trial basis to determine acceptability and demand before requesting a regular course number. Repeatable up to 12 credits.

ERTH 592 Independent Study: 1-3 Credits (1 Other)
PREREQUISITE: Graduate standing, consent of instructor, approval of Department Head and Dean of Graduate Studies. Directed research and study on an individual basis. Repeatable up to 6 credits.

ERTH 594 Seminar: 1-4 Credits (1-4 Other)
Course prerequisites as determined for each offering. Topics offered at the graduate level which are not covered in regular courses. Students participate in preparing and presenting discussion material. Co-convened with ERTH 494. Offered Summer. Repeatable up to 4 credits.

ERTH 595 Historical Geology for Teachers: 3 Credits (1 Lec, 1 Lab, 1 Other)
The course will provide grade 7-12 science teachers with a rigorous overview of the evolution of the Earth and life and of the methods that geologists use to investigate the history of our planet. Offered Fall.

ERTH 596 Geology of Glacier National Park for Teachers: 2 Credits (1 Lec, 1 Lab)
A field course for teachers of science examining geologic evidence for the evolution of the rocks and landscape of Glacier National Park and surrounding areas over geologic time. Offered summer.

ERTH 597 Vertebrate Paleontology for Teachers: 3 Credits (2 Lec, 1 Lab)
This course will focus on the evolution of vertebrate life throughout Earth's history. As a result of this course, students will demonstrate an understanding of evolutionary processes. Through class discussions and assignments, students will identify the vast diversity of both extinct and extant vertebrates, and their interrelationships with one another. Offered Spring.

ERTH 598 Internship: 2-12 Credits (2 Other)
PREREQUISITE: Graduate standing, consent of instructor and approval of department head. An individualized assignment arranged with an agency, business or other organization to provide guided experience in the field. Repeatable up to 12 credits.

ERTH 605 History of Geological Concepts: 3 Credits (3 Lec)
PREREQUISITE: Course limited to graduate students or senior undergraduates with permission. Weekly seminars examine the evolution of geological thinking through an exploration of its history and contributions to science. The course enables students to research the origin and importance of concepts in their area of scientific specialization.

ERTH 690 Dissertation Research: 1-10 Credits (1-10 Other)
PREREQUISITE: Doctoral candidate standing. Repeatable up to 99 credits.

ERTH 694 Doctoral Seminar: 1-3 Credits (1-3 Other)
PREREQUISITE: Doctoral candidate standing. Repeatable up to 6 credits.