Geosciences

Course Learning Outcomes are measurable statements that are used to identify the specific knowledge and skills that a student should have at the end of a course.

GEOL 1100
L1- Apply foundational knowledge and models of a discipline in the physical or natural sciences to analyze and/or predict phenomena.
L2- Apply scientific reasoning to critically evaluate assertions.
L3- Interpret and communicate scientific information via written, spoken and/or visual representations.
L4- Describe the relevance of specific scientific principles to the human experience.
L5- Test a hypothesis in the laboratory or field using discipline-specific tools and techniques for observation, data collection and analysis to form a defensible conclusion.

GEOL 1100L
L1- Apply foundational knowledge and models of a discipline in the physical or natural sciences to analyze and/or predict phenomena.
L2- Apply scientific reasoning to critically evaluate assertions.
L3- Interpret and communicate scientific information via written, spoken and/or visual representations.
L4- Describe the relevance of specific scientific principles to the human experience.
L5- Test a hypothesis in the laboratory or field using discipline-specific tools and techniques for observation, data collection and analysis to form a defensible conclusion.

GEOL 1101
L1- Apply foundational knowledge and models of a discipline in the physical or natural sciences to analyze and/or predict phenomena.
L2- Apply scientific reasoning to critically evaluate assertions.
L3- Interpret and communicate scientific information via written, spoken and/or visual representations.
L4- Describe the relevance of specific scientific principles to the human experience.
L5- Test a hypothesis in the laboratory or field using discipline-specific tools and techniques for observation, data collection and analysis to form a defensible conclusion.

GEOL 1101L
L1- Apply foundational knowledge and models of a discipline in the physical or natural sciences to analyze and/or predict phenomena.
L2- Apply scientific reasoning to critically evaluate assertions.
L3- Interpret and communicate scientific information via written, spoken and/or visual representations.
L4- Describe the relevance of specific scientific principles to the human experience.
L5- Test a hypothesis in the laboratory or field using discipline-specific tools and techniques for observation, data collection and analysis to form a defensible conclusion.

GEOL 1107
L1- Formulate/frame problems and analyze how others do so.
L2- Establish a reasoned framework for drawing conclusions and/or recommending solutions.
L3- Recognize and apply appropriate practices for analyzing ambiguous problems.
L4- Create, analyze and evaluate/interpret diverse perspectives and solutions.
L5- Identify and apply relevant information for problem solving.
L6- Effectively articulate the results of a thinking process.

GEOL 1118
L1- Students will be able to recognize common natural disasters/phenomena, including their causes and contexts.
L2- Students will be able to explain what is wrong with incorrect representations of natural disasters/phenomena, or right about correct representations, and how they know.
L3- Students will be able to offer alternatives to bad representations of natural disasters/phenomena that are not only geologically sound but also maintain narrative structure.

GEOL 2204
L1- Students will be able to describe changing Earth conditions in terms of overlapping processes associated with the various spheres (hydrosphere, cryosphere, biosphere, geosphere, atmosphere, etc.).
L2- Students will identify and explore environmental topics of relevance to communities in Idaho and the West.
L3- Students will be able to explain the evidence and processes associated with global climate change.
L4- Students will be able to apply the scientific method to environmental systems.

GEOL 2205
L1- Students will be able to explain the architecture, materials, and dynamic processes of the solid Earth.
L2- Students will understand deep geologic time and the major themes over Earth's history.
L3- Students will be able to describe and identify minerals and rocks, which constitute the basic building blocks of the Earth.
L4- Students will be able to apply the scientific method to geologic problems.

GEOL 2282
L1- Work systematically and reliably on a research project under supervision and as part of a team.
L2- Know how to present data prepared during research.

GEOL 3313
L1- Explain how minerals are classified and named.
L2- Know the names and chemical formulas of 25 important rock-forming minerals from memory.
L3- Identify minerals based on their physical, chemical, and/or optical properties, and their association with other minerals, using observations and reference tools.
L4- Explain how a petrographic microscope works and use this tool to describe and identify minerals in thin section.
L5- Assess mineral stability, composition, and phase relations using phase diagrams.
L6- Relate minerals and their properties to geologic processes on (and inside of) the Earth.
L7- Describe the role of mineral resources in our daily lives.

GEOL 3314
L1- Discriminate among the processes that form and transform rocks and magmas.
L2- Assess mineral stability, compositions, and relationships.
L3- Evaluate the geologic setting of a suite of igneous and/or metamorphic rocks in a spreadsheet to quantify petrologic processes and create diagrams.

GEOL 3315
L1- Students discover that the shape of the Earth's surface is determined by both present processes and the past legacy of climatic and tectonic events.
L2- Students can recognize that different processes act to shape a given landscape through time.
L3- Students can identify the processes by which climate shapes the Earth's surface through weathering and erosion
L4- Students can identify the processes by which tectonic forces shape the Earth's surface through uplift of mountain ranges, subsidence of basins and weakening/fracturing of rock
L5- Students understand that tectonics and climate often work together allowing for rapid uplift to typically occur where erosion (via climate) is most efficient.
L6- Students understand and can describe of both fast and slow processes that drive hillslope erosion and instability.
L7- Students understand and can describe how landscapes are organized into watersheds and how rivers allow for the transport of water and sediment off of landscapes.
L8- Students understand and can describe of how glaciers can sculpt landscapes and leave records of past climate.

GEOL 3392
L1- Learned best practices for applying for graduate school and jobs across a range of sectors.
Learned strategies for attaining your career goals.
Developed and honed a career portfolio that includes your personal statement, vision and mission statements, a resume or CV, and interview skills.

GEOL 4402
L1- Students understand how to use quantitative relationships between geomorphic variables to predict how landscapes vary in both space and time.
L2- Students are able to generate and interpret graphs and maps depicting geomorphic data.
L3- Though we study river, hillslope and glacial processes separately, students also focus on the connections across process boundaries.

GEOL 4403
L1-Students will be competent with using vector and raster data models, applying proper datums, coordinate systems and projections, how to edit data, and how to plot GPS/GNSS data to create maps.
L2- Students will explore digital data sources and how to assess data integrity.
L3- Students will also become competent in basic vector and raster spatial analysis, spatial modeling, and terrain analysis.
L4- Students will be able to semi-automate workflows with Model Builder, Python, and GeoAI.

GEOL 4403L
L1- To understand the main 4 components of GIS, vector and raster data models, basic principles of geodesy, map projections and coordinate systems.
L2- To comprehend geodatabase structure, geometric measures, georeferencing, global navigation satellite systems concepts, and use of aerial and satellite imagery in a GIS.
L3- To understand data considerations, utilize attribute data and tables in a GIS, know the basic analytical operations, and the importance of metadata and institutional/inter-institutional data standards.

GEOL 4404
L1- Students will be able to apply and understand spatial modeling using a GIS workflow in Model Builder and Python.
L2- Students will be confident in managing and creating geodatabases with advanced editing and attribute table manipulation abilities.
L3- Students will be confident in the realms of classic Desktop software, cloud mapping and competent with using new GeoAI techniques.
L4- Students will be able to write technical and scientific reports on geospatial related topics.

GEOL 4405
L1- Students will be able to describe volcanic processes, from the subsurface through secondary remobilization, including an awareness of spatial and temporal scales.
L2- Students will be able to use equations to describe and interpret volcanic processes.
L3- Students will understand the spatial and geochemical patterns associated with eruption behavior and landform morphology.
L4- Students will be able to describe volcanic hazards, including their associated products and relative risks.

GEOL 4407
L1- Students will be able to design a GPS/GNSS research project, collect/correct GPS/GNSS data, enter the data into mapping software, conduct spatial analysis of the data, and perform accuracy assessment.
L2- Students will be able to communicate results from a GPS/GNSS project in written and oral formats to communicate science.
L3- Students will have the knowledge and technical skills to use RTK GPS/GNSS ground control for UAS.

GEOL 4408
L1- To have students and guest speakers give geotechnology related presentations based on published articles and/or research.
L2- To improve the technical writing skills of students and develop proposal writing skills.

GEOL 4409
L1- Students will gain knowledge about the electromagnetic spectrum and its relationship to remote sensing in the ultraviolet, visible, infrared, thermal, and wavelength ranges.
L2- Students will be able to effectively manipulate digital images through image processing techniques such as supervised and unsupervised classification and conduct accuracy assessments.
L3- Students will be able to interpret digital images, and particularly how to design an image processing experiment to effectively extract desirable information from images.
L4- Students will understand the current state of knowledge in remote sensing and sensor technology with a focus on multispectral, hyperspectral, lidar, radar, InSAR remote sensing.

GEOL 4410
L1- Compare tools and strategies for learning, communicating, and teaching earth/environmental science, including its observational basis.
L2- Summarize the major US environmental laws and international environmental agreements.
L3- Explain how environmental history influences current technological trajectories.
L4- Apply environmental economic evaluation to contemporary environmental issues.
L5- Analyze the impacts of adopting different environmental ethics to selected issues.
L6- Discuss contemporary resource management issues from scientific, political, legal, economic, and ethical perspectives.

GEOL 4415
L1- To describe global changes during the Quaternary period and interpret the dynamic controls thereon.
L2- To develop skills of description and interpretation of unconsolidated Quaternary sediments.

L3- To understand patterns of regional manifestations of Quaternary global changes in the northern Rocky Mountain region.

GEOL 4416
L1- To describe global changes that have occurred in recent geologic history and that are occurring currently.
L2- To develop skills of critical analysis of controversial environmental topics.
L3- To understand patterns of regional manifestations of environmental changes in the northern Rocky Mountain region.

GEOL 4417
L1- Students will be able to articulate an understanding of the concepts in soil science to a degree that allows application and integration of other disciplines and perspectives.
L2- Students will develop skills in oral and written synthesis of concepts in soil science.
L3- Students will be engaged in the scientific method in field studies that allows students learn how to inquire and construct knowledge (see field work discussed below) and analyze data.

GEOL 4420
L1- An understanding of geochemical processes and pathways governing the origin, distribution and evolution of elements, compounds, isotopes and phases (minerals, liquids, gases) in geologic systems.
L2- To be able to apply basic geochemical principles, data and data collection methods to solve problems across a wide spectrum of geologic systems, emphasizing those at and near the earth's surface.
L3- To understand the role of geochemical processes in the evolution of solid earth architecture and dynamics, and in particular the dynamic interconnectivity between global geochemical systems (e.g., atmosphere, biosphere, hydrosphere and lithosphere).

GEOL 4421
L1- To describe deformational structures and interpret their kinematic history.
L2- To comprehend introductory stress-strain theory and its application to rocks.
L3- To recognize the regional tectonic association of common deformational structures.

GEOL 4422
L1- Organize and analyze geochemical datasets in Excel (or another program of your choice).
L2- Create meaningful plots of data in Excel (or another program of your choice).
L3- Synthesize the geochemical behavior of an element from reference texts and primary literature.
L4- Search scientific literature for examples of a geochemical method or measurement in action.
L5- Evaluate and discuss scientific papers.
L6- Communicate geochemical concepts, methods, data, and interpretations to a variety of audiences.

GEOL 4424
L1- Write scripts and functions in a variety of ways, to solve scientific problems and complete tasks.
L2- Write scripts and functions with clear documentation.
L3- Load and work with large datasets.
L4- Create effective illustrations of scientific data.
L5- Effectively communicate the design and use of a script or function you wrote to others.

GEOL 4427
L1- Design and implement a web-optimized object-relational database.
L2- Complete enterprise GIS tasks using relational database management system (RDBMS).
L3- Versioning and replication.
L4- Complete spatial data science workflows using data engineering skills to extract unstructured data, transform these data, and load the data into an RDBMS.

L5- Transform spatial and non-spatial data into actionable information.
L6- Apply critical thinking to questions of professional ethics.

GEOL 4428
L1- Students will learn basic programming skills in python, including code structure, loops, logic statements, I/O, and function calling.
L2- Students will learn how to use python to complete GIS tasks working on raster data.
L3- Students will learn how to use python to complete GIS tasks working on vector data.
L4- Students will develop original code to solve geospatial problems.

GEOL 4429
L1- Solve both quantitative and qualitative hydrological problems.
L2- Apply and evaluate available hydrologic tools and methods, including field equipment and computer programs.
L3- Integrate hydrologic knowledge with communication and problem-solving skills.

GEOL 4430
L1- Apply conservation of mass concepts in watershed hydrology, including measuring streamflow in large streams.
L2- Explain groundwater hydraulics and evaluate groundwater flows to wells, including conducting slug tests.
L3- Synthesize knowledge about the linkages between surface and subsurface water in regional settings.
L4- Integrate hydrologic knowledge with communication and problem-solving skills.

GEOL 4431
L1-To become familiar and to be able to recognize common organisms of the Phanerozoic fossil record.
L2- To recognize the environmental and time significance of fossil groups.
L3- To understand how fossils can be used to address geological and biological problems.

GEOL 4435
L1- To describe the phylogenetic history of the vertebrates.

GEOL 4439
L1- To know the agents that bias preservation from biosphere to lithosphere.
L2- To know how the scientific method is used in studying taphonomy to address geological, biological and zooarcheological problems.

GEOL 4440
L1- To define the mineralized areas of North America as related to geologic provinces.
L2- To identify mineralogy of primary sulfide minerals in hand specimen and thin section.

GEOL 4450
L1- Student can create descriptions of geologic surfaces, and bedrock, including complete rock descriptions of igneous, metamorphic and sedimentary rocks.
L2- To describe deformational structures and interpret their kinematic history.
L3- To make a geologic map including proper unit identification, and description.
L4- To apply critical thinking to analyze the regional tectonic association of central Idaho Student can make digital geologic map from a hand-drawn base and is familiar with making a digital geologic map directly in the field.

L5- Student can assess and act upon issues of safety and group dynamics associated with a geologic expedition into remote country.

GEOL 4451
L1- Create a portfolio of skills and experiences that you bring to future environmental positions.
L2- Apply these skills and experiences to plan, execute, and report on a real-world environmental project
L3- Analyze, interpret, and communicate environmental data to address regulatory concerns.

GEOL 4452
L1- Learn the principles of sedimentation from source to diagenesis.
L2- Understand the fundamentals of stratigraphic nomenclature, classification, and correlation of rock units.
L3- Learn hands-on investigation techniques for unconsolidated sediment, hand specimens, and field stratigraphic characterization.
L4- Learn the basics of scientific writing and dissemination.

GEOL 4454
L1- Prepare geoscience students for a career in engineering geology.
L2- Prepare geoscience students to provide the basic geologic data needed in the design and construction of heavy civil works and mining projects in rock.
L3- Provide geoscience students with background and tools to identify the basic behavior of rock in underground openings.

GEOL 4455
L1- Prepare geoscience students for a career in engineering geology.
L2- Prepare geoscience students to identify and map important geotechnical engineering features in rock/soil exposures.
L3- Provide geoscience students with information needed to prepare a contract geotechnical data report for an underground rock or soil project.

GEOL 4456
L1- To know the geologic provinces of Idaho.
L2- To comprehend geology of Idaho recreation and economic areas, so as to describe and teach this to others.

GEOL 4458
L1- To know the geologic provinces of North America.
L2- To comprehend geology of western American national parks, so as to describe and teach this to others.

GEOL 4471
L1- To apply the geography and geologic provinces of Idaho to its anthropogenic history.
L2- To comprehend western American political history especially as applied to Idaho but also in a regional sense.

GEOL 4480
L1- Special topics course, varies with the topic selected.

GEOL 4481
L1- Students will utilize their academic knowledge from coursework in the Geoscience geospatial courses and gain practical GIS knowledge from industry/government partnerships.
L2- Students will have the knowledge on how to work with industry/government partners to identify internship goals and deliverables.
L3- Students will gain knowledge outside of the classroom to better prepare them for full time employment and develop career networks.

GEOL 4491
L1- Learn the geology of the [insert location here] from the [insert geologic timespan here].
L2- Practice fundamental field skills, from technical observations to field logistics.

GEOL 4494
L1- Learn the geology of the [insert location here] from the [insert geologic timespan here].
L2- Practice fundamental field skills, from technical observations to field logistics