GEOLOGICAL ENGINEERING (G L E)

G L E 1 – COOPERATIVE EDUCATION PROGRAM
1 credit.

Work experience which combines classroom theory with practical knowledge of operations to provide students with a background upon which to base a professional career in industry.
Requisites: Sophomore standing
Course Designation: Workplace - Workplace Experience Course
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2026
Learning Outcomes: 1. Identify and respond appropriately to real-life engineering ethics cases relevant to co-op work
Audience: Undergraduate

2. Synthesize and apply appropriate technical education to real world technical work
Audience: Undergraduate

3. Communicate effectively in writing and speaking with a range of audiences in the workplace, including those without disciplinary expertise
Audience: Undergraduate

4. Develop professional and transferable habits like time management skills, collaborative problem-solving skills, and research skills for learning new information
Audience: Undergraduate

G L E 171 – INTRODUCTION TO GEOLOGICAL ENGINEERING
1 credit.

Comprehensive introduction to engineering applications of earth sciences. Exploitation and management of geologic resources; mitigation of geologic hazards such as landslides and earthquakes; abatement of environmental problems such as land and water pollution; design of surface and underground excavations; principal methods of geological engineering.
Requisites: None
Repeatable for Credit: No
Last Taught: Spring 2026

G L E/CIV ENGR 291 – PROBLEM SOLVING USING COMPUTER TOOLS
4 credits.

Introduction to engineering computations with emphasis on computer tools and computer based measurement, data collection, and processing. Tools will include computer aided design, spreadsheets, other engineering computation tools, and hardware and software for laboratory and spatial measurements.
Requisites: MATH 222 or member of Engineering Guest Students
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Use spreadsheet software to perform fundamental civil, environmental, and geological engineering calculations, analyze datasets using logical filters, and interpret numeric data meant to represent time and text values
Audience: Undergraduate

2. Use computer programming as a tool to streamline engineering data analysis tasks, create visualizations, obtain numerical approximations, and retrieve data from local and remote (web-based) data sources
Audience: Undergraduate

3. Use automatic levels, total stations, and aerial photography to conduct land surveying operations and collect the type of geospatial data required for creating drawings that support engineering design
Audience: Undergraduate

4. Explain how measuring devices (data acquisition systems and sensors) work, use measuring devices to record/monitor the physical properties of a system, and use sensor readings as the foundation to control devices in the physical world
Audience: Undergraduate

G L E/CIV ENGR 330 – SOIL MECHANICS
3 credits.

Basic principles of soil mechanics and fundamentals of application in engineering practice; soil composition and texture; classification; permeability and seepage; consolidation; settlement; shear strength; lateral earth pressures and retaining structures, shallow and deep foundations, slope stability; subsurface exploration; laboratory characterization of physical and engineering properties of soils.
Requisites: E M A 303 or M E 306, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Describe the physicochemical characteristics of soils and their importance to the engineering behavior of soils.
Audience: Both Grad & Undergrad

2. Define the factors which control the physical, mechanical and hydraulic behavior of soils.
Audience: Both Grad & Undergrad

3. Run the laboratory tests used for the determination of physicochemical properties of soils, the engineering classification of soils, hydraulic properties, and the stiffness and shear strength properties.
Audience: Both Grad & Undergrad

4. Perform analyses in each area described in the course and understand the limitations to these analyses.
Audience: Both Grad & Undergrad

5. List basic problems in Soil Mechanics design and describe how these problems are tackled.
Audience: Both Grad & Undergrad

6. Experimentally assess the interaction of multiple parameters controlling the physical, mechanical and hydraulic behavior of soils; perform more advanced 2D or 3D analyses in one area described in the course and understand the limitations of these analyses; or summarize the state of the art in one research or engineering-applied area described in the course.
Audience: Graduate

G L E/GEOSCI 350 – INTRODUCTION TO GEOPHYSICS: THE DYNAMIC EARTH
3 credits.

Methods of geophysics applied to earth structure and plate tectonics. Principles of seismology, gravity, geodesy, magnetism and heat flow.
Requisites: MATH 217, 221, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Recognize at least three factors to consider during the design of a geophysical survey.
Audience: Both Grad & Undergrad

2. Show how the travel times, amplitudes, and polarities of different kinds of seismic waves can be used to locate earthquakes, determine their focal mechanisms, and estimate their size.
Audience: Both Grad & Undergrad

3. Describe how the thicknesses and seismic velocities of geologic units can be estimated from seismic refractions and reflections.
Audience: Both Grad & Undergrad

4. Describe the factors that cause variations in gravitational acceleration across Earth's surface, and explain how gravity anomalies can be used to estimate variations in mass at depth.
Audience: Both Grad & Undergrad

5. Draw Earth's magnetic field lines, describe how rocks record information about Earth's paleomagnetic field, and describe how paleomagnetic measurements can be used to infer movement of Earth's tectonic plates through time.
Audience: Both Grad & Undergrad

6. Define the concept of "magnetic anomaly", describe how magnetic surveys can be used for local studies of the subsurface, and describe circumstances in which magnetic surveys may be useful.
Audience: Both Grad & Undergrad

7. Define geotherm and describe why temperatures increase with depth below Earth's surface.
Audience: Both Grad & Undergrad

8. State the theory of plate tectonics and describe at least three kinds of supporting evidence, enumerate the major types of tectonic plate boundaries and the type of movement that occurs at each, and describe what drives the movements of the plates.
Audience: Both Grad & Undergrad

9. Explain the relationship between gravitational force and mass.
Audience: Graduate

10. Describe the factors that cause variations in gravitational acceleration across Earth's surface.
Audience: Graduate

11. Explain how gravity anomalies are used to estimate variations in mass at depth.
Audience: Graduate

G L E/GEOSCI 360 – PRINCIPLES OF MINERALOGY
3 credits.

Minerals, their physical and chemical properties, crystallography, and geologic significance.
Requisites: (GEOSCI 100 or ENVIR ST/GEOSCI 106) and (CHEM 103, 109, 115, or concurrent enrollment), graduate/professional standing, or member of Engineering Guest Students
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2025
Learning Outcomes: 1. Use a petrographic microscope for mineral identification.
Audience: Both Grad & Undergrad

2. Identify around 40 common minerals (around 30 silicate minerals, and around 10 oxide, carbonate, and sulfide minerals).
Audience: Both Grad & Undergrad

3. Describe and apply concepts of phase transformations and solid solutions in minerals and factors that control the changes.
Audience: Both Grad & Undergrad

4. Determine the history (formation condition and possible changes / reactions) of a rock based on associated minerals and textures.
Audience: Both Grad & Undergrad

5. Write reports based on thin section observations.
Audience: Both Grad & Undergrad

6. Determine and correlate mineralogical changes with seismic discontinuities in the Earth's mantle based on crystal chemistry principles.
Audience: Both Grad & Undergrad

7. Explain the basics of nano-phase minerals in earth surface environments and their potential impacts on/in water and air.
Audience: Both Grad & Undergrad

8. Evaluate relevant scientific literature related to mineralogy and crystallography.
Audience: Graduate

G L E/GEOSCI 370 – ELEMENTARY PETROLOGY
3 credits.

Igneous and metamorphic rocks, studied in hand sample and thin section.
Requisites: G L E/GEOSCI 360, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Identify, describe, and classify crystalline rocks.
Audience: Both Grad & Undergrad

2. Use phase equilibria and phase diagrams for interpreting rock petrogenesis.
Audience: Both Grad & Undergrad

3. Describe the main processes and tectonic settings of magma generation and diversification.
Audience: Both Grad & Undergrad

4. Interpret trace elements and isotope diagrams to determine igneous petrogenesis.
Audience: Both Grad & Undergrad

5. Describe conditions and main tectonic settings of metamorphism.
Audience: Both Grad & Undergrad

6. Identify and describe metamorphic textures and fabrics.
Audience: Both Grad & Undergrad

7. Evaluate relevant scientific literature related to igneous and metamorphic petrology.
Audience: Graduate

G L E/ENVIR ST/GEOG/GEOSCI/LAND ARC 371 – INTRODUCTION TO ENVIRONMENTAL REMOTE SENSING
3 credits.

Introduction to the Earth as viewed from above, focusing on use of aerial photography and satellite imagery to study the environment. Includes physical processes of electromagnetic radiation, data types and sensing capabilities, methods for interpretation, analysis and mapping, and applications.
Requisites: (Sophomore standing and MATH 113, 114, or 171), graduate/professional standing, or member of Engineering Guest Students
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Demonstrate understanding of major theories, approaches, concepts, and methods in remote sensing science.
Audience: Undergraduate

2. Apply knowledge of the nature and properties of electromagnetic radiation and how it is affected by interactions with the atmosphere and the Earth's surface.
Audience: Undergraduate

3. Utilize the techniques, skills, and modern tools necessary for monitoring environmental phenomena with earth observation data.
Audience: Undergraduate

4. Know and effectively apply image analysis, data extraction, and map-making using earth observation data.
Audience: Undergraduate

5. Demonstrate how to analyze remote sensing data using photo-interpretation, digital image processing, and photogrammetric techniques using specialized software, within geographic information systems (GIS), and in conjunction with other data sources.
Audience: Undergraduate

6. Demonstrate how to perform classification, change detection, data fusion, and radiometric and geometric correction techniques.
Audience: Undergraduate

7. Identify and appropriately utilize data types from the optical, thermal, and microwave portions of the electromagnetic spectrum, and from a wide range of airborne and satellite platforms, including high (>5 m), medium (10-30 m), and coarse (250-1000 m) spatial resolution imagery.
Audience: Undergraduate

8. Demonstrate knowledge about environmental applications of remote sensing data, such as forest inventory, water resource management, agricultural assessment, land use planning, and global change science.
Audience: Undergraduate

9. Write clear and concise laboratory reports (in scientific format) describing analytical results from image classification and change detection experiments.
Audience: Undergraduate

10. Communicate effectively through discussion, small group work, hands-on lab activities, and written reports.
Audience: Undergraduate

G L E 401 – SPECIAL TOPICS IN GEOLOGICAL ENGINEERING
1-3 credits.

Various topics in the field of geological engineering.
Requisites: None
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2026

G L E/CIV ENGR 421 – ENVIRONMENTAL SUSTAINABILITY ENGINEERING
3 credits.

Uses the three paradigms of sustainability (environmental, social, and economic) for strategic environmental initiatives in an engineering setting. Proactive environmental management opportunities, including practices of pollution prevention, industrial ecology, and design for the environment. A systems approach to manufacturing, examining the life cycle of products, incorporating total cost accounting, extended producer responsibility, and design for end-of-life.
Requisites: (MATH 217 or 221) and (CHEM 104 or 109), or graduate/professional standing or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2024
Learning Outcomes: 1. Articulate why sustainability is important and relevant within the practice of engineering
Audience: Both Grad & Undergrad

2. Apply sustainability tools such as industrial ecology, life cycle assessment, economic assessment, material flow analysis, and criticality to inform engineering decisions
Audience: Both Grad & Undergrad

3. Analyze sustainability issues and/or practices using a systems-based approach
Audience: Both Grad & Undergrad

4. Describe the social, economic, and environmental dimensions of engineering and identify potential trade-offs and interrelationships among these dimensions at a level appropriate to the course
Audience: Both Grad & Undergrad

5. Identify and critique recent peer reviewed sustainability literature
Audience: Graduate

G L E/CIV ENGR 430 – INTRODUCTION TO SLOPE STABILITY AND EARTH RETENTION
1 credit.

Introduction to theory and approaches commonly used in geotechnical engineering practice for design and analysis of slopes and earth retaining structures.
Requisites: CIV ENGR/G L E 330, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Calculate the factor of safety of natural or engineered slopes
Audience: Both Grad & Undergrad

2. Design simple earth retaining structures
Audience: Both Grad & Undergrad

3. Perform additional design strategies to design complex slope or retaining structures
Audience: Graduate

4. Lead a team of undergraduate students for the final design project exercise
Audience: Graduate

G L E/GEOSCI 431 – SEDIMENTARY & STRATIGRAPHY LAB
1 credit.

Covers Sedimentology and Stratigraphy; emphasizes qualitative and quantitative description and interpretation of sediments and sedimentary deposits.
Requisites: GEOSCI 204 or G L E/GEOSCI 360, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2025

G L E/CIV ENGR 432 – INTRODUCTION TO SHALLOW AND DEEP FOUNDATION SYSTEMS
1 credit.

Introduction to theory and approaches commonly used in geotechnical engineering practice for design and analysis of slopes and earth retaining structures.
Requisites: CIV ENGR/G L E 330, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Apply methods and requirements of a subsurface investigation program
Audience: Both Grad & Undergrad

2. Collect sufficient information to design basic shallow or deep foundation systems
Audience: Both Grad & Undergrad

3. Fulfill the design criteria for different structures and facilities
Audience: Both Grad & Undergrad

4. Design shallow and deep foundation structures
Audience: Both Grad & Undergrad

5. Perform additional design strategies to design the foundation of a soil retaining structure
Audience: Graduate

G L E/CIV ENGR 434 – INTRODUCTION TO UNDERGROUND OPENINGS ENGINEERING
1 credit.

Subsurface stress; rock failure criteria; openings in competent rock; openings in layered rocks; plastic behavior around openings in weak rock; stereographic projections and stereonet; block theory; rock bolts; stabilization methods and design.
Requisites: CIV ENGR/G L E 330, GEOSCI/CIV ENGR/G L E/ M S & E 474 or concurrent enrollment, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Predict stress concentrations around underground openings
Audience: Both Grad & Undergrad

2. Identify weak points around underground openings in conjunction with the rock mass type information
Audience: Both Grad & Undergrad

3. Design openings to minimize hazard
Audience: Both Grad & Undergrad

4. Design reinforcement strategies
Audience: Both Grad & Undergrad

5. Perform advanced design strategies
Audience: Graduate

G L E/CIV ENGR/ENVIR ST/GEOSCI 444 – PRACTICAL APPLICATIONS OF GPS SURVEYING
2 credits.

Global positioning system surveying for field applications. Signals. Coordinate systems. Datums. Cartographic projections. Satellite orbits. Choosing hardware. Strategies for data collection and analysis. Assessing uncertainty. Geocoding satellite images. Integrating data with Geographic Information Systems. Emerging technologies.
Requisites: MATH 211, 217, 221, or graduate/professional standing, or member of Engineering Guest Students
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Describe the current abilities, future potential, and limiting factors of GPS surveys.
Audience: Both Grad & Undergrad

2. Assess the tradeoff between accuracy and cost.
Audience: Both Grad & Undergrad

3. Summarize examples of applications of GPS surveying.
Audience: Both Grad & Undergrad

4. Design and implement a small field project using GPS surveying.
Audience: Both Grad & Undergrad

5. Assess quantitatively statistical precision and calibrated accuracy.
Audience: Graduate

G L E/GEOSCI 455 – STRUCTURAL GEOLOGY
4 credits.

Principles of rock deformation, structures in layered rocks, structural analysis, intrusive structures. Lab: three-dimensional problems involving structural concepts; field trip.
Requisites: GEOSCI 202, 204, and (G L E/GEOSCI 370 or concurrent enrollment), graduate/professional standing, or member of Engineering Guest Students
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Use conceptual models as a foundation for quantitative analysis of physical processes of interest to geologists and engineers.
Audience: Both Grad & Undergrad

2. Summarize and articulate parameters influencing the geometries and types of geologic structures resulting from deformation in different tectonic environments.
Audience: Both Grad & Undergrad

3. Recognize common geological structures and determine their kinematic, dynamic, and rheologic significance.
Audience: Both Grad & Undergrad

4. Characterize rock deformation quantitatively.
Audience: Both Grad & Undergrad

5. Utilize a range of common approaches to documenting, representing, and manipulating structural data.
Audience: Both Grad & Undergrad

6. Recognize patterns formed from isolated data points to construct an appropriate conceptual model of a 3D geologic structure.
Audience: Both Grad & Undergrad

7. Extract and convey three-dimensional information using two-dimensional diagrams.
Audience: Both Grad & Undergrad

8. Analyze kinematic, dynamic, and rheological approaches to specific field settings.
Audience: Graduate

G L E/CIV ENGR/GEOSCI/M S & E 474 – ROCK MECHANICS
3 credits.

Classification of rock masses, stress and strain in rock, linear and non-linear behavior of rock, failure mechanisms, state of stress in rock masses, lab testing, geological and engineering applications.
Requisites: E M A 201, PHYSICS 201, 207, or 247, or graduate/professional standing, or member of Engineering Guest Students
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Measure basic index properties for rock mass classification
Audience: Both Grad & Undergrad

2. Describe stress and strain in continuums
Audience: Both Grad & Undergrad

3. Describe the factors which control the mechanical behavior of rocks
Audience: Both Grad & Undergrad

4. Apply basic concepts of rock mechanics and rock physics to analyze basic geomechanical engineering problems
Audience: Both Grad & Undergrad

5. Prepare rock samples for mechanical testing, conduct experiment, and analyze experimental data to obtain rock strength properties
Audience: Both Grad & Undergrad

6. Describe analytically time-dependent rock behaviors
Audience: Graduate

G L E 479 – GEOLOGICAL ENGINEERING DESIGN
4 credits.

A practical problem in an area of geological engineering (such as development of a geologic resource or design of a structure in soil and/or rock) is selected, and then the principles and processes of design and analysis are applied to the solution of the problem.
Requisites: Senior standing, declared in Geological Engineering BS, and CIV ENGR/G L E 530, 532, 535, 635, 735, GEOSCI/G L E 629, CIV ENGR 414, 427, 514, or (CIV ENGR/G L E 430, 432, and 434)
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Integrate and apply the knowledge gained in prior coursework into a simulated real-world design environment
Audience: Undergraduate

2. Use open-ended problem-solving skills
Audience: Undergraduate

3. Work effectively in a multidisciplinary team environment
Audience: Undergraduate

4. Use oral and written communication skills to articulate proposed and completed work
Audience: Undergraduate

5. Explain basic concepts in management, business, and public policy
Audience: Undergraduate

6. Explain the importance of professional licensure
Audience: Undergraduate

7. Identify common failure mechanisms of a component, process, or system and their causes and prevention
Audience: Undergraduate

G L E 489 – HONORS IN RESEARCH
1-3 credits.

Undergraduate honors research projects supervised by faculty members.
Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2023

G L E/CIV ENGR 511 – MIXING AND TRANSPORT IN THE ENVIRONMENT
3 credits.

Application of fluid mechanics to understand the mixing and transport of contaminants, pollutants, and other solutes in the environment. Introduction to chemical and biochemical transformation processes as well as boundary interactions at the air-water and sediment-water interfaces. Transport phenomena: diffusive processes, advective processes, turbulent diffusion, and shear flow dispersion. Introduction to both analytical and computational solutions with applications to mixing and transport in rivers, lakes, the atmosphere, and coastal waters.
Requisites: (CIV ENGR/G L E 291, COMP SCI 220, or E C E 203) and (CIV ENGR 310 or M E 363), graduate/professional standing, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2024
Learning Outcomes: 1. Recall the principles of conservation of mass, advective mass flux and Fick's law for diffusive mass flux
Audience: Both Grad & Undergrad

2. Apply the fundamental solution to the diffusion equation and use the principle of superposition to construct new solutions
Audience: Both Grad & Undergrad

3. Calculate the diffusivity given data of concentration distribution over time, and conversely, calculate the concentration distribution over time given the diffusivity
Audience: Both Grad & Undergrad

4. Calculate new solutions to advection-diffusion equation by modifying known solutions to include first-order reactions
Audience: Both Grad & Undergrad

5. Explain the differences between molecular diffusion, turbulent diffusion and shear flow dispersion
Audience: Both Grad & Undergrad

6. Apply models of mass transfer at boundaries to compute interfacial mass exchange between air-water and sediment-water interfaces
Audience: Both Grad & Undergrad

7. Evaluate the importance of mixing and transport processes in environmental processes and assess the utility of different types of solutions.
Audience: Graduate

G L E/CIV ENGR 520 – REACTIVE PROCESSES FOR SUSTAINABLE ENERGY AND RESOURCE PRODUCTION
3 credits.

Key scientific concepts related to fossil and renewable energy resources. Apply the fundamentals of thermodynamics and chemical kinetics at solid interfaces to better understand the science behind using fossil and renewable energy resources. Evaluate the impacts of existing and emerging energy technologies on the environment.
Requisites: Senior standing, (MATH 211, 217, or 221), (CHEM 103, 104, or 109), and CIV ENGR 320, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Learning Outcomes: 1. Identify major issues pertaining to energy and environmental science and engineering, and evaluate the sustainability of technologies grounded in the science of material and energy balances and reaction kinetics
Audience: Both Grad & Undergrad

2. Derive and solve mathematical expressions to describe energy and material transformations
Audience: Both Grad & Undergrad

3. Critically evaluate and present their analysis and synthesis of literature in this area of energy and environment
Audience: Both Grad & Undergrad

4. Evaluate and propose novel technological solutions grounded in the fundamentals of thermodynamics of kinetics
Audience: Graduate

5. Analyze and defend emerging technologies in the area of energy and environment
Audience: Graduate

G L E/CIV ENGR 530 – SEEPAGE AND SLOPES
3 credits.

Practical aspects of seepage effects and ground water flow. Stability of natural and man-made slopes under various loading conditions. Design and construction of earth dams and embankments. Flow net and its use; wells; filters; total and effective stress methods of slope analysis; selection of pertinent soil parameters.
Requisites: CIV ENGR/G L E 330, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2025
Learning Outcomes: 1. Characterize and classify slope failure
Audience: Both Grad & Undergrad

2. Identify stability risk factors in generalized slope design
Audience: Both Grad & Undergrad

3. Apply soil and rock mechanics and strength principles in the context of slope stability investigation and design
Audience: Both Grad & Undergrad

4. Determine strength parameters of soil materials under saturated and unsaturated conditions
Audience: Both Grad & Undergrad

5. Understand pore fluid pressure in underground environments and its effect on manmade structures integrated within the soil as well as the failure potential of differing geometries
Audience: Both Grad & Undergrad

6. Design slope remedial plans for earth structures subjected to varying physical properties, overburden and pore pressures, and restrictive geometries
Audience: Both Grad & Undergrad

7. Act as leaders of the small groups they have been assigned for the mini design project
Audience: Graduate

G L E/CIV ENGR 532 – FOUNDATIONS
3 credits.

Shallow and deep foundations. Analysis and design of footings, mats, piers and piles, and related fill and excavation operations. Consolidation settlement, time rate of settlement, stress distribution, elastic (immediate) settlement, load bearing capacity; methods to reduce settlements and increase shear strength; the selection of a foundation system.
Requisites: CIV ENGR/G L E 330, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2024
Learning Outcomes: 1. Provide examples of when and where to consider shallow foundation systems in lieu of deep foundation systems and where stone columns or rammed aggregate piers are appropriate
Audience: Both Grad & Undergrad

2. Scope and Prepare a Foundation Investigation, including the equipment and standards used for subsurface exploration and the advantages/disadvantages therein
Audience: Both Grad & Undergrad

3. Calculate Allowable Bearing Pressure using (a) presumptive values, (b) the bearing capacity equation and (c) in situ approaches
Audience: Both Grad & Undergrad

4. Design a safe spread foundation system where structural capacity exceeds demand
Audience: Both Grad & Undergrad

5. Design a drilled shaft and a driven pile for axial loading considering vertical loading and a settlement estimate
Audience: Both Grad & Undergrad

6. Prepare a bid sheet, plan set, and set of specifications for a successful foundation design
Audience: Both Grad & Undergrad

7. Use soil moduli in the application of a laterally loaded deep-foundation system using an appropriate software program with a hand-calculated backcheck
Audience: Graduate

G L E/CIV ENGR 534 – NONDESTRUCTIVE EVALUATION
3 credits.

Practical aspects of nondestructive evaluation (NDE) techniques for identifying physical properties and damage within civil and geologic materials and structures. Data analyses and data science for wave propagation, arrival picking, distributed fiber optic sensing, and visualization tools such as augmented/mixed/virtual reality.
Requisites: E M A 201, PHYSICS 201, 207, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2025
Learning Outcomes: 1. Describe multiple nondestructive evaluation (NDE) testing methods and their applications
Audience: Both Grad & Undergrad

2. Characterize flaws within Civil and Geological Engineering materials
Audience: Both Grad & Undergrad

3. Determine source locations of flaws or damage within a structure based on NDE data
Audience: Both Grad & Undergrad

4. Characterize both active and passive elastic wave observations in rock
Audience: Both Grad & Undergrad

5. Apply seismological principles to observed acoustic emissions for determining source locations of microcracks and infer the mechanism of failure
Audience: Both Grad & Undergrad

6. Analyze fiber optic distributed acoustic sensing (DAS) to find earthquake events within timeseries data
Audience: Both Grad & Undergrad

7. Apply artificial intelligence techniques to analyze fiber optic sensing data
Audience: Graduate

G L E/CIV ENGR 535 – WIND ENERGY BALANCE-OF-PLANT DESIGN
3 credits.

Wind Energy Development and Balance-of-Plant Design. Up-front coverage includes the science and mechanics of wind energy including turbine basics, wind resource assessment, energy production, and economic return. Balance-of-plant design aspects include site layout and micro-siting, foundation systems, collector systems and interconnection, site civil and electrical infrastructure, and structural tower analysis. Development includes environmental due diligence and permitting, stakeholder engagement, energy policy and markets, and levelized cost of energy (LCOE).
Requisites: PHYSICS 201, 207, 247, E M A 201, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Provide the necessary steps to evaluate the wind resource at a prospective site by characterizing and correlating (vertically and horizontally) the wind speed distribution functions
Audience: Both Grad & Undergrad

2. Translate (forward and backward) wind power: kinetic to mechanical to electrical and select appropriate wind turbine given site wind resource and turbine power curve
Audience: Both Grad & Undergrad

3. Demonstrate knowledge of the mechanics and principles of the tower load document, shallow and deep foundation designs, transportation logistics, geotechnical investigation and reporting, thermal resistivity and collection system design, and interconnection
Audience: Both Grad & Undergrad

4. Develop civil balance-of-plant engineering calculation design bases for access roads, stormwater control, turbine foundations, and crane pads and electrical balance-of-plant engineering calculation design bases for the collection system, grounding, substation design, and interconnection
Audience: Both Grad & Undergrad

5. Analyze sustainability issues and/or practices using a systems-based approach.
Audience: Both Grad & Undergrad

6. Describe the social, economic, and environmental dimensions of wind energy and identify potential tradeoffs and interrelationships among these dimensions at an intermediate level.
Audience: Both Grad & Undergrad

7. Prepare an economic Pro Forma for a successful distributed wind project and calculate Levelized Cost of Energy (LCOE) and environmental Life Cycle Assessments (LCAs) of green-house gasses, water use, and CO2 per kW h.
Audience: Graduate

G L E/GEOSCI 537 – QUANTITATIVE METHODS FOR GEOSCIENCE
3 credits.

MATLAB is a powerful, high-level programming language and integrated development environment (IDE) that is used across a broad variety of scientific disciplines for tasks including data visualization, modeling, and application development. Focus on the active use of MATLAB for developing practical programming and data analysis skills that can be applied across a range of geoscience- relevant problems. Applications will include: data visualization and publishable figure development; automation of data processing; statistical and time-series analysis; image processing and mapping; and optimization. Additional topics may be guided by student interest.
Requisites: MATH 222, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2025
Learning Outcomes: 1. Utilize an integrated development environment and documentation to solve geoscientific problems.
Audience: Both Grad & Undergrad

2. Interpret code in a high-level programming language to explain what an existing program does.
Audience: Both Grad & Undergrad

3. Organize geologic data and store them using appropriate data structures.
Audience: Both Grad & Undergrad

4. Develop basic algorithms by using key programming structures including: for-next loops, if-then-else statements, built-in functions, and other custom-built functions.
Audience: Both Grad & Undergrad

5. Plan, design and create a useful, well-documented computer program/utility that has general applicability.
Audience: Graduate

6. Develop codes that apply appropriate spatio-temporal data analysis routines to geologic datasets.
Audience: Graduate

7. Integrate data from several data sources to produce publication-ready maps or other geologically relevant figures.
Audience: Graduate

8. Implement quantitative models for geologic processes using appropriate analytical or numerical toolboxes.
Audience: Graduate

G L E/GEOSCI 594 – INTRODUCTION TO APPLIED GEOPHYSICS
3 credits.

Survey of applied geophysics, including seismic refraction, seismic reflection, electrical resistivity, gravity, and magnetics methods. Basic physics of each method and modeling techniques and field procedures.
Requisites: MATH 222 and (PHYSICS 202, 208, 248, or E M A 202), graduate/professional standing, or member of Engineering Guest Students
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2025
Learning Outcomes: 1. Describe the fundamental physics underlying applied geophysical methods and how these measurements and techniques are used to explore and characterize the near surface.
Audience: Both Grad & Undergrad

2. Describe the limitations of geophysical techniques and tools.
Audience: Both Grad & Undergrad

3. Describe the field procedures employed to collect geophysical data.
Audience: Both Grad & Undergrad

4. Use geophysical techniques to interpret and analyze geophysical data collected for applied and engineering purposes.
Audience: Both Grad & Undergrad

5. Evaluate the application of geophysical technique through critical analysis of published literature.
Audience: Graduate

G L E/GEOSCI 595 – FIELD METHODS IN APPLIED AND ENGINEERING GEOPHYSICS
1 credit.

The application of geophysical field methods for delineating near-surface features and/or structures as applied to engineering, environmental and exploration problems.
Requisites: GEOSCI/G L E 594 or concurrent enrollment, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2025
Learning Outcomes: 1. Utilize different geophysical tools.
Audience: Both Grad & Undergrad

2. Analyze geophysical data with the help of computer modeling tools.
Audience: Both Grad & Undergrad

3. Report geophysical measurements and interpretations.
Audience: Both Grad & Undergrad

4. Design field-based surveys that use different geophysical techniques.
Audience: Both Grad & Undergrad

5. Report the geology of a site and the requirements for engineering and environmental applications to geophysical techniques.
Audience: Graduate

G L E/GEOSCI 596 – GEOMECHANICS
3 credits.

Observation, description, and prediction of deformation of geomechanical systems at depth, and the forces (stress) causing those deformations, relevant for petroleum/geothermal reservoirs and studies of earthquake mechanics. Emphasis on computational exercises using datasets from the petroleum industry and earthquake catalogues, as well as prediction of ground deformation.
Requisites: GEOSCI/CIV ENGR/G L E/M S & E 474, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Breadth - Physical Sci. Counts toward the Natural Sci req
Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2022
Learning Outcomes: 1. Conduct a borehole geomechanical analysis
Audience: Both Grad & Undergrad

2. Design casing plans for drilling
Audience: Both Grad & Undergrad

3. Use borehole data and earthquake focal mechanisms to gain information about in-situ stress and strain
Audience: Both Grad & Undergrad

4. Describe modern challenges in developing subsurface energy resources

Audience: Both Grad & Undergrad

5. Use modern software to find crustal deformation models that match observed ground deformation
Audience: Graduate

G L E/CIV ENGR 612 – ECOHYDROLOGY
3 credits.

Mutual interactions between the hydrologic cycle and ecosystems, including hydrologic mechanisms that underlie ecological patterns and processes, movement of water and energy through the soil-plant-atmosphere continuum, application and development of models for simulating ecohydrologic processes, and case studies on ecohydrologic function and ecosystem services of varied environments.
Requisites: CIV ENGR 311, GEOSCI/G L E 627, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2024
Learning Outcomes: 1. Identify, describe, and quantify ecohydrologic processes
Audience: Both Grad & Undergrad

2. Build and use models for simulating hydrologic processes, ecologic structure and vegetation composition
Audience: Both Grad & Undergrad

3. Work effectively and collaborate in groups to communicate ecohydrologic concepts
Audience: Both Grad & Undergrad

4. Critically evaluate the ecohydrologic literature
Audience: Graduate

G L E/GEOSCI 627 – HYDROGEOLOGY
3-4 credits.

Mathematical treatment of the physical principles governing the flow of groundwater; emphasis on well hydraulics and flow system analysis.
Requisites: (GEOSCI 100, 109, 110, ATM OCN/GEOSCI 105, 140, ENVIR ST/GEOSCI 106, or ASTRON/GEOSCI 160) and (MATH 217 or 221), graduate/professional standing, or member of Engineering Guest Students
Course Designation: Level - Intermediate
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2025
Learning Outcomes: 1. Describe how groundwater flow and storage are impacted by geology.
Audience: Both Grad & Undergrad

2. Collect high-quality data in the field and laboratory to quantify hydrogeologic processes and properties.
Audience: Both Grad & Undergrad

3. Integrate data from wells, field reports and surficial data to create reasonable conceptual models of aquifers and surface water / groundwater interactions.
Audience: Both Grad & Undergrad

4. Implement appropriate quantitative analyses to characterize aquifer properties based on aquifer tests.
Audience: Both Grad & Undergrad

5. Apply numerical simulations and assess the output of these simulations in terms of their hydrologic meaning and predictions.
Audience: Both Grad & Undergrad

6. Critique news and technical reports related to groundwater science using hydrogeologic principles.
Audience: Graduate

G L E/GEOSCI 629 – CONTAMINANT HYDROGEOLOGY
3 credits.

Physical and chemical processes governing the transport of solutes in groundwater; application of hydrogeologic and geochemical theory and practice to the protection of aquifers from contamination.
Requisites: G L E/GEOSCI 627 and MATH 222, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Explain the physical, chemical, and biological processes controlling the transport of subsurface contaminants.
Audience: Both Grad & Undergrad

2. Apply mathematical expressions for analytically describing solute, colloid, and multiphase flow in porous and fractured media.
Audience: Both Grad & Undergrad

3. Interpret and synthesize scientific literature and technical reports to create subsurface flow and transport models of specific case studies.
Audience: Both Grad & Undergrad

4. Analyze the causes of, and solutions for, the sustainability challenge of natural and anthropogenic contaminants in the subsurface.
Audience: Both Grad & Undergrad

5. Explain the social, economic, and/or environmental dimensions of the sustainability challenges relevant to the protection of groundwater resources from contamination.
Audience: Both Grad & Undergrad

6. Create and evaluate a subsurface flow and transport model related to their graduate research or another specific environmental problem.
Audience: Graduate

G L E/CIV ENGR 635 – REMEDIATION GEOTECHNICS
3 credits.

Geotechnical practice for remediation of sites containing contaminated soil and groundwater is discussed. Topics include non-invasive and invasive subsurface exploration techniques, methods to monitor for the presence of contaminants in the saturated and unsaturated zones, and geotechnically-oriented remedial action technologies.
Requisites: CIV ENGR/G L E 330, graduate/professional standing, or member of Engineering Guest Students
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2023

G L E 699 – INDEPENDENT STUDY
1-3 credits.

Requisites: Consent of instructor
Course Designation: Level - Advanced
L&S Credit - Counts as Liberal Arts and Science credit in L&S
Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2026

G L E/GEOSCI 724 – GROUNDWATER FLOW MODELING
3 credits.

An introduction to the principles of modeling groundwater flow systems, with emphasis on regional flow system analysis. Conceptual understanding of governing equations, and the use of finite difference techniques to solve such equations are stressed. Develop codes and become introduced to packaged models, including those developed by the U. S. Geological Survey. Knowledge of hydrogeology [such as G L E/GEOSCI 627 or 629] required.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2025
Learning Outcomes: 1. Formulate a groundwater flow problem as a PDE-based mathematical statement from first principles (conservation of mass, conservation), and summarize how different governing equations are derived.
Audience: Graduate

2. Develop an algebraic approximation of a PDE and solve the algebraic equation using direct or iterative methods.
Audience: Graduate

3. Apply the USGS software MODFLOW intelligently and recognize the inherent assumptions in different options and packages.
Audience: Graduate

4. Evaluate model predictions and uncertainty using model refinement, testing, and calibration.
Audience: Graduate

G L E/CIV ENGR 730 – ENGINEERING PROPERTIES OF SOILS
3 credits.

Determination and interpretation of soil properties for engineering purposes; physio-chemical properties of soil-water systems, permeability and capillarity, compression characteristics of soils, measurement of soil properties in the triaxial test, properties of frozen soils and permafrost.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2022
Learning Outcomes: 1. Describe the physicochemical characteristics of soils and their importance to the engineering behavior of soils
Audience: Graduate

2. Define the factors which control the hydraulic and mechanical behavior of soils
Audience: Graduate

3. Evaluate how engineering classification of soils capture fundamental responses
Audience: Graduate

4. Run and interpret laboratory tests used to characterize how physical and chemical properties of particles affect the behavior of soil masses, including hydraulic properties and the stiffness and shear strength properties
Audience: Graduate

5. Explain models that describe the behavior and properties of soils
Audience: Graduate

G L E/CIV ENGR 732 – UNSATURATED SOIL GEOENGINEERING
3 credits.

Engineering principles of unsaturated soils as they apply to geotechnical and geoenvironmental systems. Effect of soil water suction and stress on hydraulic conductivity, shear strength, and compressibility of soils in the context of geoengineering problems of flow and stability. Knowledge of Soil Mechanics [such as CIV ENGR/G L E 330] is required.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2025
Learning Outcomes: 1. Define properties of unsaturated soils
Audience: Graduate

2. Use principles of interfacial physics, hydrology, and soil mechanics to interpret unsaturated soil behavior
Audience: Graduate

3. Use results from measurement methods to characterize unsaturated soil properties
Audience: Graduate

G L E/CIV ENGR 733 – PHYSICOCHEMICAL BASIS OF SOIL BEHAVIOR
3 credits.

Applications of physiochemical, mineralogical and environmental considerations to the engineering behavior of soils. Soil composition, formation, fabric, pore fluid chemistry and interaction of phases. The particulate nature of soils and the fabric-engineering property (volume change, strength, deformation and conduction) relationships. Knowledge of Soil Mechanics [such as CIV ENGR/G L E 330] is required.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Spring 2026
Learning Outcomes: 1. Characterize properties of soils that consist partly or wholly of clay
Audience: Graduate

2. Define the composition and fabric of natural soils, their surface and pore-fluid chemistry, and the physical and chemical factors that govern fine-grained soil behavior
Audience: Graduate

G L E/GEOSCI 747 – TECTONOPHYSICS
3 credits.

Elasticity and flexure of the earth's lithosphere, heat conduction, mantle convection, earthquake mechanisms, rock rheology, and fluid migration in the earth's crust; integration of geophysical observations, laboratory experiments, and theoretical models.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2022
Learning Outcomes: 1. Demonstrate an understanding of the Scientific Theory of Plate Tectonics by writing, solving, illustrating, and exemplifying Euler's formula for rigid tectonic plates moving on a sphere.
Audience: Graduate

2. Demonstrate an understanding of the earthquake deformation cycle in time and space by sketching a map over ~100 km and a time series over ~1000 years.
Audience: Graduate

3. Demonstrate an understanding of the physical principles of crustal deformation by writing, applying, and solving the differential equations governing motion under the constitutive relations for rigid, elastic, and Maxwell visco-elastic rheologies.
Audience: Graduate

4. Demonstrate an understanding of quantitative reasoning for testing geophysical hypotheses by comparing two competing models with appropriate statistical tests.
Audience: Graduate

5. Visualize plate motions on a 3-dimensional sphere by writing, debugging, and writing computer applications.
Audience: Graduate

6. Analyze geophysical data and interpret them by implementing simple models in the Matlab computer language.
Audience: Graduate

G L E/GEOSCI 757 – ADVANCED ROCK MECHANICS
3 credits.

Experimental rock mechanics, rock mechanics apparatus design, static and dynamic rock friction, rate and state friction, crack phenomena and rock fracture mechanics, earthquake energy budget, elastic/viscoelastic/plastic behavior of rocks, engineering and geological applications. Knowledge of introductory rock mechanics [such as M S E/GEOSCI/CIV ENGR/G L E/M S & E 474] required.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: No
Last Taught: Fall 2021
Learning Outcomes: 1. Analyze technical construction of rock mechanics apparatuses
Audience: Graduate

2. Design and fabricate load cells and displacement sensors
Audience: Graduate

3. Measure dynamic rock frictional properties for fault instability analysis
Audience: Graduate

G L E 790 – MASTER'S RESEARCH OR THESIS
1-9 credits.

Under faculty supervision.
Requisites: Declared in Geological Engineering MS
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2026

G L E 801 – SPECIAL TOPICS IN GEOLOGICAL ENGINEERING
1-3 credits.

Topics vary.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2025

G L E 890 – PRE-DISSERTATOR'S RESEARCH
1-9 credits.

Under faculty supervision.
Requisites: Declared in Geological Engineering PHD
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2026

G L E 900 – SEMINAR
1 credit.

Topics vary.
Requisites: Graduate/professional standing
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Spring 2026

G L E 990 – RESEARCH AND THESIS
1-9 credits.

Under faculty supervision.
Requisites: Declared in Geological Engineering PHD
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Fall 2024

G L E 999 – INDEPENDENT WORK
1-3 credits.

Under faculty supervision.
Requisites: Consent of instructor
Course Designation: Grad 50% - Counts toward 50% graduate coursework requirement
Repeatable for Credit: Yes, unlimited number of completions
Last Taught: Summer 2023