Add new courses:

**GEOL 424 – GIS for Geoscientists**  
3 Credit Hours  
Introduction to Geographic Information Systems (GIS), which are computer systems for input, storage, manipulation, and display of data georeferenced to the surface of the Earth or other planetary bodies. Participants will become familiar with a GIS software package, learn fundamental concepts of mapping and data manipulation, and will design and execute a GIS project in their own area of geologic interest.  
Recommended Background: Two introductory geology or physical geography courses.

**GEOL 524 – GIS for Geoscientists**  
3 Credit Hours  
Introduction to Geographic Information Systems (GIS), which are computer systems for input, storage, manipulation, and display of data georeferenced to the surface of the Earth or other planetary bodies. Participants will become familiar with a GIS software package, learn fundamental concepts of mapping and data manipulation, and will design and execute a GIS project in their own area of geologic interest.  
Recommended Background: Two introductory geology or physical geography courses.

**GEOL 543 – Sustainable Cities and Landscapes**  
3 Credit Hours  
Examines the ecology of urban systems. Starting with an overview of basic ecological principles, we study how the emergence of cities has impacted natural systems and how this impact has accelerated. Focus on solutions, most notably the various ways that cities can be designed to reduce human impacts. The ultimate goal is to design cities to meet human needs while reducing the human footprint by increasing ecological functions.

**GEOL 554 – Environmental Restoration**  
3 Credit Hours  
Applications of ecology and geological sciences toward restoring natural systems to become more fully functioning ecosystems. Topics include: geological mitigation, ecological succession, non-native species, and many case studies. At least one field trip to a nearby ecological restoration site will be required.  
Recommended Background: An introductory course in geology, physical geography, conservation or basic ecology.

Revise to remove prerequisite and change corequisite:

**GEOL 310 – Mineralogy**
4 Credit Hours
Contact Hour Distribution: 3 hours lecture and one 2-hour lab.
(RE) Corequisite(s): Chemistry 120.
Recommended Background: Two 100-level geology courses.

Formerly:
Contact Hour Distribution: 3 hours lecture and one 2-hour lab.
(RE) Prerequisite(s): Chemistry 120.
(RE) Corequisite(s): Chemistry 130.
Recommended Background: Two 100-level geology courses.

Revise title:

GEOL 450 – Landscapes: Earth and Elsewhere
3 Credit Hours

Formerly:
GEOL 450 – Geomorphology
3 Credit Hours

Revise to add cross listing and prerequisites and delete recommended background:

GEOL 465 – Geomicrobiology
3 Credit Hours
Introduction to interactions between microbes and earth materials (rock, soil, water). Course will identify and evaluate key biogeochemical and genetic evidence used to determine biotic from abiotic processes in modern and ancient systems. Topics include microbial ecology and diversity, community structure, biogeochemistry, molecular biology, major environmental habitats, astrobiology, and geomicrobiological applications for geology, engineering, and mining.
(Same as Microbiology 465.)
(Re) Prerequisite(s): ENGL 102, 132, 290, or 298 and one eight-credit sequence chosen from ASTR 151-153 and 152-154; ASTR 217-218; BIOL 101-102; BIOL 113-114-115; BIOL 150-160-159; BIOL 158-168-167; CHEM 100-110; CHEM 120-130; CHEM 128-138; GEOG 131-132; GEOG 137-132; or two courses chosen from GEOL 101, 102, 103, 104, 107, 108; or PHYS 135-138, 137-138, or 221-222.

Formerly:
GEOL 465 – Geomicrobiology
3 Credit Hours
Introduction to interactions between microbes and earth materials (rock, soil, water). Course will identify and evaluate key biogeochemical and genetic evidence used to determine biotic from
abiotic processes in modern and ancient systems. Topics include microbial ecology and diversity, community structure, biogeochemistry, molecular biology, major environmental habitats, astrobiology, and geomicrobiological applications for geology, engineering, and mining. Recommended Background: Two 100-level geology courses, one lab course in geology and one lab course in chemistry, or consent of instructor.

Geology is primary.

Geology and Environmental Studies Major, BS – Environmental Studies Concentration,
Corequisites, C. Select one sequence, Delete 1st option:

BIOL 101 – Introduction to Biology: Cells, Genetics, and Physiology
BIOL 102 – Introduction to Biology: Biodiversity and Ecology

Geology and Environmental Studies Major, BS – Environmental Studies Concentration,
Concentration Requirements, B. Complete five courses, add course to list:

GEOL 454 – Environmental Restoration

Geology Major, MS, 2nd section, Requirements, Revise to:
Requirements
The department offers a thesis option for its regular master’s program and a non-thesis for its concurrent master's program. Successful completion of the regular master's degree requires a minimum of 24 credit hours approved coursework, and six credit hours of thesis credit (GEOL 500), an approved written thesis proposal, successful oral defense of a written thesis, and a minimum cumulative 3.0 GPA in all graded graduate course work. The department also has separate course requirements in addition to University requirements. Students pursuing a MS degree must enroll in GEOL 595 every semester they are in residence unless course or teaching conflicts preclude a student from being present. Students must also enroll in GEOL 596 one time during their residency. Taking courses from outside the department is encouraged. Before receiving an MS degree, students must demonstrate committee-approved proficiency in field-based Earth Sciences.

For students enrolled in the PhD program, a concurrent master’s degree may be awarded as a non-thesis option. To be eligible a student should: a) not have a prior master’s degree in Geology; b) have successfully completed all University and departmental course requirements for the regular master’s degree; c) have demonstrated a committee-approved proficiency in field-based Earth Sciences; d) have a PhD dissertation proposal accepted; e) have passed his/her preliminary exams; and f) have at least one first author paper submitted for consideration for publication in a peer-reviewed journal.

Formerly:

Requirements
The department offers only a thesis option in its master's program. Successful completion of the master's degree requires a minimum of 24 credit hours approved coursework, and six credit hours of thesis credit
an approved written thesis proposal, successful oral defense of a written thesis, and a minimum cumulative 3.0 GPA in all graded graduate course work. The department also has separate course requirements in addition to University requirements. Students pursuing a MS degree must enroll in GEOL 595 every semester they are in residence unless course or teaching conflicts preclude a student from being present. Students must also enroll in GEOL 596 one time during their residency. Taking courses from outside the department is encouraged. Before receiving an MS degree, students must demonstrate committee-approved proficiency in field-based Earth Sciences.