

Field Geology of New York City and Long Island

Rationale:

Public Health, Public Transportation, Water Works, and Environmental Protection – these are endeavors controlled by huge agencies devoted to the implementation of public policy, the oversight of municipal construction and megaconstruction, and associated legal issues. The endeavors, which touch all of us in our daily lives, are strongly founded in the subjects of geology and engineering. This one semester Freshman seminar field trip program is unique in that it documents the connection between science and public policy with field trips to see first-hand, the places, issues, and geological controls on such policy. The proposed course addresses issues related to public health and construction in NYC and Long Island through the lens of the professional field geologist.

Goals and Objectives (See Detailed Explanation on Last Page):

Students will study the methods of geologic field observation and the collection of field data in the context of geological controls on construction in the Earth's environment. We will examine the Proterozoic to Paleozoic bedrock underpinnings of Manhattan and the Bronx that allows for the construction of huge high-rise buildings and the support of subsurface tunneling and natural sites that liberate airborne asbestos into the environment.. In addition, we will visit sites important to water management and examine younger Cenozoic strata on Long Island that harbors our local drinking water supply. The objectives of the course are to:

1. Develop reasoning, critical thinking and writing skills in a technical subject, and,
2. Experience the methods of field science, collection, and analysis of samples and field data in the form of maps, charts, diagrams, and reports.

Textbook: Wicander, R.; Monroe, J. S.; Bennington, J. B.; and Merguerian, C., 2007, Essentials of Geology with Geology of New York and New Jersey, 4th Edition, Thomson Brooks/Cole Publishers, 510 p.

Lectures: Monday/Wednesday 10:10 AM – 12:00 PM in 013 Breslin Hall

Labs: Meet Mondays 2:10-4:00 PM in 225 Gittleson Hall (6 lab sessions only) + two sessions at end of the semester for PowerPoint presentations.

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Lecture Syllabus

First Half (Geological Primer)

Fundamentals, the History of Geology, and the Abyss of Time (Ch. 1, 17, 18)
How the Earth Works – Plate Tectonics, Volcanism, and Earthquakes (Ch. 2)
Minerals of the Earth's Crust (Ch. 3)
Rocks and the Rock Cycle (Ch. 4, 5, 6, 7, 8)
Earthquakes and the Earth's Interior (Ch. 9) – **[MIDTERM EXAM – Ch. 1-9; 17, 18]**

Second Half (Applied Geology)

History of Investigations – Geology of NYC and Environs (Ch. 20)
Proterozoic and Paleozoic Mountain Building (Ch. 10, 20)
Mesozoic Continental Fragmentation and Development of Rift Basins (Ch. 20)
Cenozoic Landscape Development and Pleistocene Glaciation (Ch. 14, 20)
Megaconstruction Projects in NYC (Outside Readings)
Drinking Water Supplies (Ch. 13) – **[FINAL EXAM – Ch. 10, 13, 14, 20, Supplement]**

Weeks 13 and 14 – Student PowerPoint Presentations [P1] (Mandatory Lab Attendance)

Each student will present a 10 minute PowerPoint with a 5 minute class discussion. Students can choose their own topic with instructor's approval or select a topic from instructor list (e.g. - 1884 NYC Earthquake; Palisades Intrusive Sheet, NJ; Geology of NYC and Vicinity - Long Island; Manhattan; Brooklyn; The Bronx; Staten Island; Queens; Central Park; Riverside Park; Twin Islands; NYC Water Tunnel; Bedrock Geology of NYC; Bear Mountain; Hudson River; Hudson Submarine Canyon; 125th Street "Manhattanville" fault; Serpentinites and Asbestosis; Drinking Water Supply Networks; Tunneling in NYC; etc.

Grading for PowerPoints is 60% by instructor for presentation, 20% for student attendance, and 20% by peer student grading. A minimum 5-page written report **[R3]** will be required from all students by the last class session. (See detailed instructions on Blackboard.)

Lectures: Thursday 10:10 – 12:00 PM in 162 Gittleson Hall.

Laboratory Syllabus

Lab 01 – Mineral Physical Properties (9/08)	Lab 04 – Rock Classification [R2] (10/06)
Lab 02 – Mineral Identification [R1] (9/15)	Lab 05 – Topographic and Geological Maps (10/13)
Lab 03 – Rock Textural Analysis (9/22)	

Labs: Meet Mondays 2:10 PM – 4:00 PM in 225 Gittleson Hall for about five sessions starting the second week of the semester (08 Sept), then we will have three all day Saturday or Sunday field trips to NYC and NJ (Inwood Hill, Staten Island, Paterson NJ) based on student schedules. Each student **MUST** attend two of the trips and attending the third will provide extra credit.

Preliminary Schedule - Weekend One-Day Field Trips

1 - Field Trip to Isham and Inwood Parks, NYC (Sunday, 21 Sept 2008)

Proterozoic and Paleozoic Geology (Inwood and Manhattan Schist(s))

Identifying Rocks and Minerals in the Field

Project Mapping Rock Structure and Faults and Measuring Glacial Striae Orientation

2 - Field Trip to Staten Island, NYC (Sunday, 28 Sept 2008)

Collisional Mountain Belts and Serpentinites

Graniteville Feeder for the Palisades Intrusive Sheet

Staten Island Serpentinite - Natural Sources of Asbestos Fibers in the World of Geology

Project Digging into Slope Wash to Expose Glacial and Cretaceous Strata

Glacial Strata and Paleotundra Glaciotectonic Overthrusts

3 - Field Trip to Fort Lee and Paterson, NJ (Saturday, 18 Oct 2008)

Mesozoic Stratigraphy and Geological Time

Walking in the Wake of Dinosaur Footprints

The Palisades Intrusive Sheet – Contact Relationships and Bounding Strata

The Watchung Lava Flows – Contact Relationships and Bounding Strata

New Models on the Genesis of the Palisades Intrusive Sheet

Mineral Collecting at the New Street Quarry, Paterson, NJ

Grading: Final Grades are based on the midterm and final exams (50%), lab and field exercise reports (25%), and PowerPoint presentation and allied research paper (25%).

Attendance: Mandatory per guidelines of the NYS Education Department.

Office Hours: Tuesdays 9:00 AM to 12:00 PM or by appointment, 141 Gittleson Hall.

Faculty Webpage: http://people.hofstra.edu/faculty/charles_merguerian contains useful links, outside readings, and award-winning Hamster movie reviews.

Blackboard Site: All course materials, including field trip guides, are available through the blackboard site set up for this course.

Email: Charles.Merguerian@hofstra.edu

Note: Geology 014F students are invited to attend the Geology 001 field trip to SE New York and New Jersey slated for **01 November 2008** for extra credit.

Hofstra University Learning Goals and Objectives

Field Geology of New York City and Long Island – GEOL 014F (NS)

Geology Department:

- 1. Students will develop the basic observational skills they need to function as geoscientists.**
 - 1a. Students will make measurements and use various quantitative units to describe phenomena and will practice converting quantities from one unit to another.
 - 1b. Students will use maps (topographic and geologic) to estimate distances, visualize landforms, and locate / identify geographic and geologic features.
 - 1c. Students will identify at least 20 common minerals in hand samples and in field exposures of rock.
 - 1d. Students will identify the common forms of igneous, metamorphic, and sedimentary rock in hand samples and in field exposures.
- 3. Students will apply critical thinking skills such as inductive and deductive reasoning to solve geological problems using the scientific method.**
 - 3e. Students will demonstrate the ability to integrate new data with their current understanding of geologic systems to formulate or evaluate a hypothesis.

HCLAS General Education Distribution:

- 2. Students will apply analytical reasoning across academic disciplines.**
 - 2c. Apply quantitative, inductive, and deductive reasoning.
 - 2d. Apply abstract thinking and conceptual modeling.
 - 2e. Apply scientific methods to investigate and analyze the natural world.
- 3. Students will demonstrate proficiency in written communication.**
 - 3a. Compose grammatical sentences.
 - 3c. Compose a sequence of paragraphs that develop a point.
 - 3e. Write an effective argumentative essay.
- 4. Students will demonstrate proficiency in oral communication.**
 - 4a. Demonstrate skill in oral communication for purposes such as informing, persuading, and/or defending.
 - 4b. Compose and deliver effective, audience-appropriate oral presentations that develop and support a point; or participate in formal debates; or lead or participate in collaborative discussion of a question or a text.
 - 4c. When appropriate, use visual, auditory, and/or technological aids.
- 6. Students will demonstrate information literacy.**
 - 6a. Conduct research using the variety of information sources available to them.
 - 6c. Integrate sources effectively and ethically through proper citation.
- 7. Students will demonstrate technological competency.**
 - 7a. Demonstrate the ability to use general or discipline-specific technologies to identify, retrieve, analyze, and communicate ideas and information.