Objectives of the Course

1. Students will be able to create interdisciplinary, age-appropriate learning activities for students that utilize NYC cultural resources, focusing on the following state-mandated subjects:
   - Locating points on Earth (latitude, longitude, map reading)
   - Minerals and their cultural applications
   - Rocks and their cultural applications
   - Weathering
   - Mining and natural resources
2. Students will be able to identify common rocks, rock-forming minerals, and ore minerals.
3. Students will be able to deduce geological/tectonic environments from suites of earth materials
4. Students will be able to analyze cultural artifacts through a geological lens
5. Students will be able to extract geological data and metadata from cultural resources.
6. Students will be able to evaluate the impact of technologies for extraction and use of earth materials
7. Students will be able to use computer-based media (word processors, Powerpoint, and/or websites) to convey both text and graphic information

Outcomes Anticipated for Course

1. Students will identify and interpret common rocks and minerals
2. Students will describe how geological materials contribute to the legacy of a culture, including that of NYC
3. Students will extract geological data and metadata from artifacts and paintings
4. Students will use the Metropolitan Museum of Art as a geological teaching resource
5. Students will use websites, guidebooks, and other written sources to further understand their environment; students will accredit the authors appropriately.
6. Students will share insights and resources
7. Students will use technology to communicate graphic information effectively
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<th>Lab / Fieldtrip</th>
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<td>Mineral Properties and Identification of Oxide, Carbonate, and Sulfate Minerals</td>
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<td>Igneous Processes: Melting, Crystallization, Differentiation</td>
<td>Glazes as an Igneous Process Investigation: Preparation and Application of Glazes</td>
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<td>4</td>
<td>Igneous Rocks and Plate Tectonics</td>
<td>Glazes as an Igneous Process Investigation: Results or Firing and Follow-Up</td>
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<td>Physical and Chemical Weathering</td>
<td>Rock Identification I: Igneous Rocks</td>
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<td>Metamorphic Rocks and Plate Tectonics</td>
<td>Rock Identification II: Sedimentary and Metamorphic Rocks</td>
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<td>Rock and Mineral Midterm Exam (Includes sample identification)</td>
<td>Earth Materials in Met Ancient Cultures Halls: Field Trip</td>
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<td>Formation of Metallic Ore Deposits</td>
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<td>Pigments: Colors from Minerals</td>
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<td>Techniques of Mining and Smelting</td>
<td>Pigments in Inks and Paints at the Met (6 hours for 2 lab equivalents)</td>
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<td>Fossil Fuels</td>
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<td>Global Distribution of Natural Resources</td>
<td>Presentation of Student Projects</td>
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Method of Evaluation

Group Presentations

Glaze Analysis: 10%

- Students will examine the components of glazes in terms of their mineralogical and chemical composition, and the effect of the components on the character of a glaze (an example of a solidified molten silicate)
- Students will experiment with variations on a standard glaze recipe, and note the effects after firing, and attempt to explain the results in terms of such parameters as fluxing, viscosity, and color
- Students will present their work, and in a follow-up, instructor-led discussion compare and contrast their results, and better understand the complexities of magmatic systems

Materials in Ancient Culture Halls: 15%

- A student group will each examine the collections on display at the metropolitan Museum of Art for an ancient culture (Roman, Greek, Egyptian, Middle Eastern, and Mesoamerican) in order to develop an inventory of the commonly used earth materials (stone, metal, gems) used for palaces and temples, homes, housewares, and jewelry
- Students will present their work, and in a follow-up, instructor-led discussion compare and contrast their results, to uncover patterns in materials use, understanding why certain materials are chosen, and the geographic limitations on some materials

Paints and Metadata in Paintings: 10%

- In a full-day field trip to the Metropolitan Museum of Art groups of students will first document colors applied to arts (paints, inks, etc) in paintings, illuminated manuscripts, frescoes, etc., by different cultures in the 12th-15th centuries. Based on their knowledge of color agents in glazes, students will infer the mineral content of pigments used.
- Students will present their findings informally, to note similarities and differences in pigment in time and place
- Students will meet with a conservator who will lecture on the minerals used in paint pigments at different times, and show students the laboratory in which art works are tested for authenticity based on their mineral composition
- Student groups will visit 16th to 19th century painting halls to compare the colors used in paints for landscapes, and also document geological information contained within these paintings (e.g., climate, landforms, change in landforms, etc.) and write a brief synopsis of their findings.

Student Projects and Guides: 20%

- Student groups will choose a site within NYC to examine in terms of the earth materials used. Example sites are the Brooklyn Bridge, Wall Street, or the Bridges of Central Park. Students will identify the earth materials present, and take into account the age, use, and prestige of the site in interpreting why these specific earth materials were used.
- Students will present their work, and in a follow-up, instructor-led discussion compare and contrast their results, to uncover patterns in materials use, understanding why certain materials are chosen, and the geographic limitations on some materials

Midterm Exam: 15%

Final Exam: 30%
Method of Assessment

Two forms of assessment will be used in this course: 1) group presentation; and 2) exams. Each of these aims to characterize the degree of achievement of distinct objectives of the course.

Group presentations: These require students to form cooperative groups, negotiate times to meet, share information, and allocate tasks effectively. This activity will provide an early indication of the degree to which students share insights and resources. Furthermore, the oral presentations all involve the analysis of objects and images and therefore must employ technology such as Powerpoint or webpages to deliver the content effectively. Each of the three presentations require students to extract geological data and metadata from artifacts and paintings and describe how geological materials contribute to the legacy of a culture. Two projects are based on collections at the Metropolitan museum of art, and therefore serve to assess the students’ ability to use the Met as a geological resource. The final student project is based on a setting outside of the Met, and thereby assesses the students’ ability to describe how geological materials contribute to an area within NYC, and their ability to use websites, guidebooks, and other written sources to further understand their environment.

Exams: The midterm and final exam are the means by which students will be assessed on their ability to describe minerals as chemical compounds, the processes of rock, ore and fossil fuel formation, interpret the environment of earth material formation, and their ability to identify common rocks and minerals. The final exam also provides a means for students to describe the societal applications of earth materials.
Bibliography


