EAS 41300/A1300/EES79903 Environmental Geochemistry
Spring 2014

Instructor: Dr. Pengfei Zhang, MR-932, 212-650-5609, pzhang@sci.ccny.cuny.edu
Time: Tu, Th, 2:00 – 3:15 pm; Location: MR107; Office hours: Tu, 12 – 2pm

Description:
This course will focus on key principles of aqueous geochemistry and main controls on the chemistry of pristine and polluted soil, surface, and ground water environments, with a system science approach. Topics include chemical thermodynamics and kinetics; acid-base reactions, oxidation-reduction reactions, ion exchange and other surface reactions; geochemistry of clay minerals, colloids, and soils; isotope geochemistry; geochemical cycles of carbon, nitrogen, and sulfur; water pollution and water treatment.

Objectives:
At the completion of this course, students should have:
(1) a deep understanding of basic reactions in aqueous geochemistry;
(2) knowledge of geochemical cycles of matter; and
(3) a good understanding of the nature and types of water pollutants

Prerequisite:
Prerequisite:
EAS 10600 or EAS 21300; EAS 217; Physics 204 or 208 or Chemistry 104 or equivalent, or by permission

Required Textbook:

Other Useful Texts:

Grading:
Exams: 300 points (100 points for midterm and 200 points for final)
Problem sets: 160 points (8 homework sets, 20 points each)
Term paper (graduate students only): 100 points. Graduate students will prepare a term paper that critically reviews a topic in environmental, aqueous, or isotope geochemistry. Details will be provided in class early in the semester.
Attendance and participation: 40 points
Total: 500 points for undergraduate students and 600 points for graduate students
Extra points: 5 points for each seminar attended (with a one page summary), for a maximum of 20 points (4 seminars). Seminars will be announced on Blackboard.
Grading scale: A: ≥93%, A−: 90-92%, B+: 87-89%, B: 84-86%, B−: 80-83%, C+: 77-79%, C: 74-76%, C−: 70-73%, D: 60-69%, F: <60%

Course policy:

Homework and reports will be due at the beginning of class on the specified due date. No late homework or reports will be accepted. Attendance is required, and 10 points will be deducted for each missed lecture. Any student who misses more than four classes will be dropped from the course. The CCNY policy on academic integrity will be strictly followed.

Assessment Tools

(1) Homework Assignments; (2) Exams; and (3) End of Course Survey

Schedule:

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<tr>
<th>Date</th>
<th>Lecture Topics</th>
<th>Reading</th>
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<tr>
<td>Jan. 28</td>
<td>Introduction</td>
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<tr>
<td>Jan 30, Feb. 4</td>
<td>Principles of inorganic chemistry</td>
<td>Ch. 5, 6, 7</td>
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<tr>
<td>Feb. 6, 11</td>
<td>Chemical thermodynamics</td>
<td>Ch. 11, handout</td>
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<tr>
<td>Feb. 13, 18, 25</td>
<td>Chemical kinetics</td>
<td>Ch. 15.1, handout</td>
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<td>Feb. 20</td>
<td><strong>No class, Monday schedule</strong></td>
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<tr>
<td>Feb. 27</td>
<td>Homework review</td>
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<tr>
<td>Mar. 4</td>
<td>Introduction to aquatic chemistry</td>
<td>Handout</td>
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<td>Mar. 6, 11</td>
<td>Acids and bases</td>
<td>Ch. 9</td>
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<tr>
<td>Mar. 13, 18</td>
<td>Carbonate chemistry, solubility of salts</td>
<td>Ch. 10, handout</td>
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<td><strong>Mar. 20</strong></td>
<td><strong>Mid-term</strong></td>
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<tr>
<td>Mar. 25, 27</td>
<td>Oxidation-reduction reactions</td>
<td>Ch. 14</td>
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<td>Apr. 1,3</td>
<td>Clays and colloids</td>
<td>Ch. 13</td>
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<td>Apr. 8</td>
<td>Sorption and other surface reactions</td>
<td>Handout</td>
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<td>Apr. 10</td>
<td>Weathering and soils</td>
<td>Ch. 19, 21</td>
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<td><strong>Apr. 14-22</strong></td>
<td><strong>Spring Recess</strong></td>
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<td>Apr. 24</td>
<td>Water pollution and wastewater treatment</td>
<td>Ch. 22, handout</td>
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<td>Apr. 29, May 1</td>
<td>Biogeochemical cycles</td>
<td>Handout</td>
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<td>May 6, 8</td>
<td>Isotope geochemistry</td>
<td>Ch. 16-18</td>
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<td>May 13</td>
<td>Hazardous wastes</td>
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<td>May 15</td>
<td>Graduate student presentations</td>
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<td>May 22</td>
<td><strong>Final, 1:00-3:15PM</strong></td>
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The instructor reserves the right to modify this syllabus during the semester.