

**Geology 231
Water and Pollution
Fall Quarter**

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Office Hours:

Class:

Course Outline

Week	Lecture
1	<p>1. Introduction to Water Pollution</p> <p>1.1 Definition of pollution</p> <p>1.2 Categories of pollution</p> <p>1.3 Sources/causes of pollution</p> <p>2. Water and the Hydrologic Cycle</p> <p>2.1 Water quality</p> <p>2.2 The physical properties of water</p> <p>2.3 The hydrologic cycle: precipitation, evaporation, infiltration, evapotranspiration, runoff.</p>
2	<p>3. Ground Water</p> <p>3.1 Origin of ground water</p> <p>3.2 Geologic formations as aquifers, types of aquifers.</p> <p>3.3 Ground water basins, springs.</p> <p>3.4 Ground water in the United States</p> <p>3.5 Ground water movement: Darcy's law.</p> <p>3.6 Movement of contaminants in ground water.</p>
3	<p>4. Aquatic Ecosystems</p> <p>4.1 Trophic level structure</p> <p>4.2 The Eltonian Pyramid</p> <p>4.3 Laws of Thermodynamics</p> <p>4.4 Contaminant transfer</p> <p>4.5 Population dynamics</p> <p>4.6 Bacteria and water pollution</p> <p>4.7 Bacteria as decomposers</p> <p>4.8 Biochemical Oxygen Demand</p>
	Exam No. 1

4	<p>5. Dissolved Oxygen and Natural Purification</p> <p>5.1 Organic water pollution</p> <p>5.2 Factors affecting DO concentrations</p> <p>5.3 Photosynthesis, respiration, reaeration, decomposition</p> <p>5.4 Natural purification</p> <p>6. Algae and Eutrophication</p> <p>6.1 Algae 6.2 Eutrophication</p>
5	<p>7. The Nitrogen and Phosphorous Cycles</p> <p>7.1 The nitrogen cycle</p> <p>7.2 Forms and natural sources of nitrogen</p> <p>7.3 Anthropogenic sources of nitrogen</p> <p>7.4 Effects of nitrogen pollution</p> <p>7.5 The phosphorous cycle</p> <p>7.6 Forms and sources of phosphorous</p> <p>7.7 Effects of excess phosphorous</p> <p>8. Thermal Pollution</p> <p>8.1 Sources of thermal pollution</p> <p>8.2 Effects of thermal pollution</p> <p>8.3 Thermal stratification</p>
6	<p>9. The Sulfur Cycle</p> <p>9.1 Sources and occurrences of sulfur</p> <p>9.2 Acid deposition</p> <p>9.3 Bacteria and the sulfur cycle</p> <p>9.4 Acid Mine Drainage</p>
	Mid-term No. 2
7	<p>10. Pollution by Inorganic Materials and Metals</p> <p>10.1 Mercury pollution</p> <p>10.2 Lead pollution</p> <p>10.3 Cadmium pollution</p> <p>11. Pollution by Pesticides</p> <p>11.1 Development of pesticides</p> <p>11.2 The pesticides problem</p> <p>11.3 Pesticide Toxicity</p>
8	<p>12. Pollution from Petroleum Hydrocarbons</p> <p>12.1 The nature and composition of oil</p> <p>12.2 Sources of pollution</p> <p>12.3 Fate of oil in water</p> <p>12.4 Toxicity and biological effects</p>
9	13. Wastewater treatment and disposal

	13.1 Types of water treatment: coagulation and flocculation, settling, filtration, disinfection. 13.2 Collection of wastewater 13.3 Characteristics of wastewater 13.4 Onsite wastewater disposal 13.5 Central wastewater treatment
	Mid-Term No. 3
10 -11	14. Hazardous Waste 14.1 Magnitude of the problem 14.2 Waste processing, handling, and transportation. 14.3 Hazardous waste management 14.4 Radioactive waste
	Final Exam (comprehensive)

Course Administration

Three mid-quarter and one final exams will be given. The three exams are equally weighted. Class attendance is compulsory. Class attendance will be checked randomly during the quarter. Class attendance will be 5% of the final grade.

Grading:

Mid-quarter exam I	20%
Mid-quarter exam II	20%
Mid-quarter exam III	20%
Class attendance	5%
Final exam	<u>35%</u>
Total	100%

Letter grades will be assigned at the end of the quarter according to the statistical distribution of total points.

Student Regulations

Refer to the Undergraduate and Graduate Catalogs for regulations regarding absences from class and academic dishonesty.

Textbook

Schmitz, Richard J., Introduction to Water Pollution Biology, Gulf Publishing Company, 1996, 320 pp.