

MAR 250 - Introduction to Coastal and Marine Pollution

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Spring Semester
MW 3:25-4:40 pm
JE 314

Office Hours: Tuesday 3:00-5:00 pm; Wednesday 10:00-12:00 pm, Thursday 11:00-12:00 pm. Office hours outside of scheduled times may be requested by an individual or group by email or phone.

Catalog Description: Examination of the sources, transport and fate of toxic and non-toxic contaminants in the ocean. The physical, chemical and biological processes that control the distribution and cycling of contaminants are considered along with relevant state, federal and international water pollution control policies. Particular emphasis will be placed on examples and case studies focusing on Long Island Sound.

Prerequisites: MAR 150 (Marine Studies Institute) or ESC 140 (Oceanography) or ESC 320 (Marine Science) or CHE 120 (General Chemistry) or BIO 100 or BIO 102 (General Zoology).

Rationale: There is a compelling need for a course within the Marine Studies minor to address the impacts to our coastal habitats and resources from the improper handling, treatment and disposal of society's wastes. Long Island Sound is a major coastal estuary that is contiguous to the New York-Connecticut metropolitan area. More than eight million people live within its watershed and its waterways represent a major site for recreation, transportation, and fishing activities. Long Island Sound is also a repository for wastes and contaminants derived from various sources including rivers and streams, urban and agricultural runoff, wastewater treatment plants, airborne transport, disposal of dredged material and tidal exchange with the New York City area. This course will identify the sources of contaminants entering coastal waters and address the impacts these contaminants have on natural resources. In addition, specific actions (legislative, social, engineering) designed to prevent pollution, reduce pollution or to remediate impacted coastal resources and habitats will be discussed.

Learning Objectives: On completion of this course, students should be able to:

- 1) Recognize, identify and define unique characteristics of coastal marine habitats including marshes, estuaries, rocky intertidal zones and sandy beaches;
- 2) Enumerate the social, aesthetic, economic and environmental value of these habitats;
- 3) Identify specific sources, transport and fates of metals, solid waste, nutrients, pesticides and petroleum hydrocarbons entering coastal waters;

Learning Objectives: (continued)

- 4) Recognize adverse impacts of these contaminants to coastal marine habitats and wildlife due to their presence in sediments, organism tissues and coastal waters; and
- 5) Recommend specific actions (legislative, social, engineering) to prevent pollution, reduce pollution or to remediate impacted coastal resources and habitats.

Modes of Instruction:

This course will consist of lectures, viewing of videotapes, laboratory activities and field-based activities. Students will work individually and in small groups to make observations and collect data during the laboratory exercises and field visits.

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| Course Evaluation: | Class Participation | 20% |
| | Exams 1 and 2 | 50% |
| | Research Paper | 15% |
| | New Haven Harbor report | 15% |

Student attendance and participation in class discussions are important components of the final grade. Students are expected to be prepared for each class and complete assigned readings prior to class. Reading assignments from other books and journals will be assigned in addition to the chapters from the required text. Two exams are scheduled and will cover material presented in the lectures and readings and discussed in class. The final exam will be partially cumulative. A research paper will be assigned to allow students to more fully explore scientific and management options available to address environmental issues pertaining to coastal and marine pollution of specific interest. Each paper topic requires instructor approval. The specific nature of the paper will be discussed in class. Each student will also submit a laboratory report describing sediment metal contamination in New Haven Harbor.

Required Text: *Marine Pollution*, 5th Edition, 2002. Chris Frid, Martin Attrill and Robert Clark. Oxford University Press, ISBN 0198792921. 237 pp.

Class Policies: Class attendance is expected and students are required to be at class or the predetermined field-site on time and prepared. Students are responsible for lecture material and field activities that are not in the assigned text but will be included on exams. Written assignments must be submitted on-time. Students should also be aware of the SCSU policy concerning academic honesty (SCSU 2000-2001 Student Handbook, page 93). Violators of this policy will not receive credit for the assignment.

If you need course adaptations or accommodations due to a disability, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please make an appointment with me as soon as possible.

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| Week | Topic | Chapter |
|-------------|---|----------------|
| 1 | Introduction, What is Pollution? | 1 |
| 2 | Pollution - Physical, Chemical and Biological Processes | 2 |
| 3 | Toxicology (organism responses to pollutants) | 2 |
| 4 | Characteristics of Coastal Habitats/Environments | |
| 5 | Heavy Metals [Cu, Pb, Cd, Hg] (sources and impacts) | 5 |
| 6 | Heavy Metals [Cu, Pb, Cd, Hg] (continued) | 5 |
| 7 | Exam 1, Oil Pollution: Exxon Valdez Case Study | 4&6 |
| 8 | Chlorinated Hydrocarbons (Exam 1) | 4&6 |
| 9 | Sewage, Pathogens and Sewage Treatment | 3 |
| 10 | Nutrients and Cultural Eutrophication | 3 |
| 11 | Research Papers Due, New Haven Harbor | |
| 12 | Historical Society, Research Cruise | |
| 13 | New Haven Harbor Sediment (Digests) | |
| 14 | New Haven Harbor Sediment (AAS/calculations) | |
| 15 | Plastics, Garbage and Floatable Debris | 8 |
| Finals | Exam 2 | |

Bibliography

- Chiarella, L.A. 1993. Pathogen Contamination – Assessment of Conditions and Management Recommendations. Long Island Sound Study Comprehensive and Management Plan Supporting Document. January, 1993. 36 pp.
- Executive Summary. 1993. Toxic Substance Contamination – Assessment of Conditions and Management Recommendations. Long Island Sound Study Comprehensive and Management Plan Supporting Document. January, 1993. 68 pp.
- Frankel, E. 1995. Ocean Environmental Management. Prentice Hall, Englewood Cliffs, NJ. 381 pp.
- Garrison, T. 1999. Oceanography: An Invitation to Marine Science, 3rd Edition. Wadsworth Publishing Company, Belmont, CA. 552 pp.
- Kaputa, N.P. and C.B. Olsen. 2000. Long Island Sound Ambient Water Quality Monitoring Program: Summer Hypoxia Monitoring Survey 1991-1998 Data Review. State of Connecticut Department of Environmental Protection, Bureau of Water Management, Hartford CT. September, 2000. 46 pp. + Appendicies.
- Klee, G. 1999. The Coastal Environment: Toward Integrated Coastal and Marine Sanctuary Management. Prentice-Hall, Inc., Upper Saddle River, NJ. 281 pp.
- Laws, E.A. 1993. Aquatic Pollution: An Introductory Text. Second Edition. John Wiley and Sons, Inc., New York, NY. 611 pp.
- Mecray, E.L. and M.R. Buchholtz ten Brink. 2000. Contaminant distribution in the surface sediments of Long Island Sound. *Journal of Coastal Research*, 16(3): 575-590.
- Masters, M.H. and Freeman, D. 1993. Floatable Debris Assessment of Conditions and Management Recommendations. Long Island Sound Study Comprehensive and Management Plan Supporting Document. January, 1993. 39 pp.
- Proceedings of the Fourth Biennial Long Island Sound Research Conference. November 13-14, 1998, State University of New York at Purchase. R.B. Whitlatch and J.R. Wood-Martin (Editors). The Connecticut Sea Grant College Program 2000.
- Sinderman, C.J. 1996. Ocean Pollution: Effects on Living Resources and Humans. CRC Press, Boca Raton, FL. 275 pp.
- Sumich, J.L. 1999. An Introduction to the Biology of Marine Life, Seventh Edition. WCB/McGraw-Hill. 484 pp.
- The Fifth Biennial Long Island Sound Research Conference, Program and Abstracts. 2000. November 17 and 18, 2000. University of Connecticut, Stamford, CT.

