

The Islamic University of Gaza
Faculty of Engineering/Civil Engineering Department
Environmental Chemistry (ECIV 1204)

Instructors: Prof. Abdelmajid Nassar

Semester: 1st /2026-2027

Course Objective:

The course addresses the environmental chemistry of the hydrosphere, discusses the fundamental properties of water, properties of bodies of water, and basic aquatic chemistry, including acid base behavior, phase interactions, oxidation-reduction, chelation. Moreover, it introduces the atmosphere and atmospheric chemistry, including the key concept of photochemistry. Inorganic air pollutants, including nitrogen and sulfur oxides, carbon monoxide, and carbon dioxide. The course deals with soil and discuss anthropogenic aspects of environmental chemistry.

Course Outline

CHAPTER 1: INTRODUCTION TO ENVIRONMENTAL CHEMISTRY

- 1.1 Chemistry and Environmental Chemistry
- 1.2 The Building Blocks of Matter
- 1.3 Chemical Bonds, Compound Formation and Octet Rule

CHAPTER 2: ACIDS, BASES, AND SALTS

- 2.1 The Importance and nature of Acids, Bases, and Salts
- 2.2 Dissociation of Acids and Bases in Water
- 2.3 pH and the Relationship Between Hydrogen Ion and Hydroxide Ion Concentrations
- 2.4 Preparation of Acids, Bases and Salts

CHAPTER 3: SOLUTIONS

- 3.1 The Solution Process, Solubility and Concentration
- 3.2 Standard Solutions and Titrations
- 3.3 Solution Equilibria
- 3.4 Colloidal Suspensions

Midterm Exam

CHAPTER 4: ENVIRONMENTAL CHEMISTRY OF WATER

- 4.1 Aquatic Chemistry
- 4.2 Metal Ions and Calcium in Water
- 4.3 Oxidation-Reduction - Complexation and Chelation and Water Interactions with Other Phases

CHAPTER 5: WATER POLLUTION

- 5.1 Nature and Types of Water Pollutants
- 5.2 Elemental Pollutants, Heavy Metal, Metalloid
- 5.3 Organically Bound Metals and Metalloids
- 5.4 Inorganic Species
- 5.5 Oxygen, Oxidants, and Reductants
- 5.6 Organic Pollutants, Pesticides in Water and Polychlorinated Biphenyls

CHAPTER 6: THE ATMOSPHERE AND ATMOSPHERIC CHEMISTRY

- 6.1 The Atmosphere and Atmospheric Chemistry
- 6.2 Physical Characteristics of the Atmosphere

Final Exam**Text Book:**

Stanley E. Manahan, Fundamentals of Environmental Chemistry, 3rd ed., Taylor & Francis/CRC Press, 2009

References:

Jorge G. Ibanez, Margarita Hernandez-Esparza, Carmen Doria-Serrano, Arturo Fregoso-Infante and Mono Mohan Singh. 2007. Environmental Chemistry Fundamentals. Springer.

A. Hites 2007. Elements of Environmental Chemistry. WILEY-INTERSCIENCE A JOHN WILEY & SONS, INC., PUBLICATION.

Roy M. Harrison. Understanding Our Environment An Introduction to Environmental Chemistry and Pollution. ISBN 0-85404-584-8. The Royal Society of Chemistry 1999

John Wright . 2005. Environmental Chemistry. Taylor & Francis e-Library, 2005.

Eric Lichtfouse, Jan Schwarzbauer and Didier Robert (Editors). Green Chemistry and Pollutants in Ecosystems. ISBN 3-540-22860-8. Springer Berlin Heidelberg New York.

Exams and Grading Policy:

Homework, and quizzes	20
Mid-term Exam	30
Final Exam	50
Total	100

Instructions:

- **Attendance Policy:** Attendance is important. Students with absence that exceeds 25% will not be permitted to take the final exam.

- **Homework Policy:** Homeworks are due one week after the day they were assigned. Late homeworks cannot be accepted and will not be graded.
- **Exam Policy:** Exams are closed book.