**COMMUNITY COLLEGE OF RHODE ISLAND**

**CHEMISTRY DEPARTMENT**

Syllabus and Course Information

for

# Chemistry of Our Environment

# CHEM-1OOO

Fall 2003

Credits: 4

Lecture: 3 hours/week

Lab: 3 hours/week

**Instructor:** Nicholas Alteri M.S.

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**Required Texts:** Chemistry for Changing Times , 10th Edition, by John Hill & Doris Kolb

Laboratory Experiments for Chemistry of the Environment by Robert Silberman and Kathy Tyner, 1994

# Syllabus for CHEM-1OOO Fall 2003

I. Introduction

A. The Scientific Method
B. Measurement
C. Basic vs. Applied Science, Technology
D. Classification of Matter
E. Mass, Volume, Energy, Physical States, Temperature, and Density

II. The Nature of the Atom

A. Ancient Greek Theories
B. Lavoisier, Proust, and Dalton
C. Mendeleev's Periodic Table
D. The Periodic Table
    a) Families of Elements
    b) Order and Regularity in the Periodic Table
E. Features and Uses of the Periodic Table

III. Atomic Structure

A. Electricity and the Atom
B. X-Rays and Radioactivity
C. Rutherford' s Experiment and Nuclear Structure
D. The Bohr Theory of the Atom
E. Electronic Configuration and the Periodic Table

IV. Nuclear Chemistry

A. History of Radioactivity, Measurement
B. Natural and Artificial Nuclear Changes
C. Nuclear Equations
D. Nuclear Fission
E. Nuclear Fusion
F. Half-Life of Radioactive Materials
    a. Definition
    b. Uses
G. Medicine
    a. Diagnostic
    b. Therapeutic

H. Problems associated with radioactivity

V. Atomic Models and Bonding

A. Electron-Dot Structures
B. Ionic Compounds, Formulas & Names
C. Covalent Compounds, Formulas & Names
    a. Lewis Structures
    b. Molecular Shapes
    c. Polar & Non-Polar Compounds

VI. Chemical Reactions

A. Balancing Chemical Equations
B. Avogadro's Number
C. Moles
D. Stoichiometry
E. Solutions

VII. Acid/Base Chemistry

A. Definitions and Strengths
B. The pH scale & Molarity
C. Buffers
D. Acid Rain
E. Antacids

VIII. Oxidation/Reduction

A. Definitions
B. The Electrochemical Cell
C. Electrolysis and batteries
    a. Wet & Dry Cells
    b. Primary & Secondary Batteries
    c. Fuel Cells
D. Corrosion & Rust

IX. Organic Compounds

A. The Unique chemistry of carbon
B. Hydrocarbons, nomenclature, and reactions
C. Other Families of Organic Molecules
D. Ozone Depletion (Ch. 12.12,pp.344-348)

X. Polymers and Plastics

A. History
B. Synthetic Polymers
    a. Addition Type
    b. Condensation Type

C. Uses, Problems, & Possible Solutions

XI. Energy

A. The First & Second Laws of Thermodynamics
B. Fossil Fuels
C. Nuclear Fission & Fusion
D. Solar Energy
E. Biomass and Other Renewable Energy Sources
F. Hydrogen
G. Global Warming (Ch. 12.13, pp.348-351)

XII. Biochemistry

A. The Building blocks of living systems
    a. Carbohydrates
    b. Proteins
    c. Lipids
B. Nucleic Acids
C. Vitamins & Minerals
D. Nutrition

# Chemistry of Our Environment

## Laboratory Schedule – Fall 2003

| Week | Date | Experiment # and Title | Page |
|---|---|---|---|
| 1 | Sept. 8 | Check in, Safety Demonstration | - |
| 2 | Sept. 15 | The Metric System, Density | 1, 11 |
| 3 | Sept. 22 | The Production of Light | 15 |
| 4 | Sept. 29 | Radioactivity | 33 |
| 5 | Oct. 6 | Chemical Reactions | 23 |
| 6 | Oct. ***15*** | Separation of a Mixture Using Paper Chromatography, | 69 |
| | | Analysis of Vinegar | 55 |
| 7 | Oct. 20 | Reactions of Acids with Some Common Substances | 61 |
| | | pH Properties of Common Substances | 89 |
| 8 | Oct. 27 | Activity Series of Metals, Corrosion | 37, 45 |
| 9 | Nov. 3 | Soap Preparation | 115 |
| 10 | Nov. 10 | Veteran's Day – no classes | |
| 11 | Nov. 17 | Synthesis of Aspirin | 73 |
| 12 | Nov. 24 | Recycling Aluminum Cans into Alum | 129 |
| 13 | Dec. 1 | Classification & Identification of Common Plastics | 121 |
| | | (Start Conversion of Cotton to Rayon) | 133 |
| 14 | Dec. 8 | The Worrisome Three: Fat, Sugar, & Salt | 101, 107, |
| 15 | Dec. 15 | Conversion of Cotton to Rayon, Check Out | 133 |

From: Laboratory Experiments for Chemistry of the Environment by Robert Silberman and Kathy Tyner, 1994

# CHEM-1000 Grading Information

1. There will be three hourly exams given during the semester.

The tentative dates are:

| | |
|---|---|
| Friday, October 3, 2003 | Exam 1 |
| Friday, October 31, 2003 | Exam 2 |
| Friday, December 5, 2003 | Exam 3 |

Each exam will be worth 100 points. There are no make-ups for missed exams, but only the best two exam grades will be counted for your grade. Total - 200 points

2. There will be at least four quizzes given over the semester. They will be worth 20 points each: there are no make-ups allowed, but the lowest quiz grade will be dropped. Total - 60 points

3. Laboratory reports are due when lab is completed. They are worth 20 points each, and the best 12 lab grades will be counted. There are no make-ups for missed laboratory session. Total are 240 points.

4. Four written reports (information to follow) will be due by Dec. 12, 2003. The reports are worth 25 points each.

5. A final cumulative examination will be given during the examination period. It will be worth 200 points, and the Registrar will announce the date of the exam.

6. Your attendance at lectures will be a factor in determining your final grade. A large number of absences may result in lowering your grade

7. Assignments will be collected and recorded. They will not be returned. If you want to study your assignments make Xerox copies before you hand them in to me.

8. The number of points you earn over the semester determines your final grade:

| POINTS | | GRADING RANGE | |
|---|---|---|---|
| 2 exams | 200 pts. | 720 – 800 | A |
| 3 quizzes | 60 pts. | 640 – 719 | B |
| 12 labs | 240 pts. | 560 – 639 | C |
| 4 reports | 100 pts. | 480 – 559 | D |
| 1 final | 200 pts. | Below 480 | F |
| TOTAL | 800 pts. | | |

# Chemistry of Our Environment

## Assigned End-of-Chapter Exercises

| Chapter | Exercise Numbers |
|---|---|
| 1 | 1, 4, 6, 10,12, 14, 17, 20, 30, 36, 38, 40, 44, 50, 56, 60 |
| 2 | 1, 5, 7- 9 12, 20, 26, 34, 35 |
| 3 | 1, 3- 6, 10, 11, 16, 18, 30, 32, 34, 36, 38, 56, 58, 62, 65, 70, 82 |
| 4 | 1, 2, 8, 10, 14, 17, 18, 20, 22, 24, 25, 30, 32, 36, 38, 44, 47, 50, 61, 66 |
| 5 | 1, 2, 4, 6, 8, 10, 14, 16, 18, 20, 24, 26, 28, 31, 36, 38, 42, 44, 46, 48, 50, 52, 56,58, 62, 70, 72, 74, 80, 82, 86, 90 |
| 6 | 1, 2, 6, 7, 14, 15, 22, 24, 26, 28, 38, 40, 42, 44, 46, 50, 68, 70, 76, 78, 80 |
| 7 | 1-4, 6-8, 10, 11, 13, 14, 19, 20, 22-24, 30, 38, 44, 52, 54 |
| 8 | 1, 2 5-8, 10, 12, 13, 18, 22, 26, 30, 36, 40, 49 |
| 9 | 1-3, 6, 11, 18, 20, 22, 24, 25, 32, 36, 38, 40, 42, 44, 46, 50, 52, 54, 56, 60, 63, 64 |

| | |
|---|---|
| 10 | 1-5, 8, 10, 17-20, 22, 24, 25, 27-29, 34, 38, 44, 45, 47, |
| 14 | 1-6, 11, 13-15, 19-21, 23,28, 31, 32, 34, 36-38, 40, 42, 45, 46, 54, 56 |
| 15 | 1, 3-7, 9, 11, 12, 14, 16, 19, 22, 23, 28, 31, 36, 39, 42-44, 52,60, 63, 67, 73 |
| 16 | 1-8, 11, 12, 19, 22, 29, 34, 36, 38, 39, 45, 47, 50,52, 54, 57,59, 79, 80 |

# Lab Manual Renumbering List

Pages 9-1 to 9-6, renumber 55 to 60.

Pages 8-1 to 8-7, renumber 61 to 68.

Pages 15-1 to 15-9, renumber 73 to 81.

Pages 18-1 to 18-5, renumber 101 to 105.

Pages 19-1 to 19-8, renumber 107 to 114.

Pages 17-1 to 17-7, renumber 121 to 127.

# Community College of Rhode Island

## Chemistry of Our Environment

## Directions for the written reports:

Submit four newspaper or magazine articles that relate to chemistry. Some suggested sources include The Providence Journal, The New York Times, Newsweek, Time, and the Internet. The articles must be current. That is, they must come from a Sept. 2003 or later newspaper, magazine, or journal issue. The articles must be appropriate for this course. That is, they must relate to some chemical concept and not be too technical. If you have any questions about the suitability of your article, I would STRONGLY urge you to show it to me before you submit the report. Each News Comment is worth 25 points. Along with the original article or a copy, you must comment on the information found in the article. The following page should be completed and submitted along with the news item. The reports must be typed.

| | | |
|---|---|---|
| Due Dates for Reports: | Report 1 | Sept. 26 |
| | Report 2 | Oct. 24 |
| | Report 3 | Nov. 21 |
| | Report 4 | Dec. 12 |

All reports may be submitted before their due dates.

**Name**_____ **CHEM 1000 sec**.__

**News Comment # _____** **Date**_____

Source:

Date of Publication:

Major Area of Chemistry:

Briefly summarize the article. (10 points)

Does this article portray chemistry in a good or bad way? Explain. (5 points)

Does this article contain information that surprises or upset you? Explain. (5 points)

What effect will this information have on you? Explain. (5 points)