Oakland University College of Arts and Sciences
Departments of Chemistry and Physics

Basic Information

<table>
<thead>
<tr>
<th>Departments:</th>
<th>Chemistry and Physics</th>
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<tbody>
<tr>
<td>Course Prefix:</td>
<td>SCI 100: Section 001 (CRN 13050)</td>
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<tr>
<td>Course Title:</td>
<td>Physical Science in Life, the World and Beyond</td>
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<tr>
<td>Credit Hours:</td>
<td>4</td>
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The course meets Tuesdays and Thursdays from 10:00 – 11:47 AM. Thursday sessions will be held in 168 SEB. Most Tuesday sessions will be laboratory sessions held in 230-240 HHS.

Web Site

Address: [http://webct.oakland.edu](http://webct.oakland.edu)

There is a web site for this class. You are **required** to use the site. See the separate document for how to access and use the site. The web site address (URL) is: [http://webct.oakland.edu](http://webct.oakland.edu)

Instructor Information

<table>
<thead>
<tr>
<th>Names:</th>
<th>Rao Bidhanapally</th>
<th>Dagmar Cronn</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offices:</td>
<td>270 HHS</td>
<td>285 SEB</td>
</tr>
<tr>
<td>Mailboxes:</td>
<td>Dept. of Physics</td>
<td>Dept. of Chemistry</td>
</tr>
<tr>
<td></td>
<td>190 SEB</td>
<td>260 SEB</td>
</tr>
<tr>
<td>Phones:</td>
<td>(248) 370-4872</td>
<td>(248) 370-4064</td>
</tr>
<tr>
<td>E-mail Addresses:</td>
<td>WebCT email or</td>
<td>WebCT email or</td>
</tr>
<tr>
<td></td>
<td><a href="mailto:burao@oakland.edu">burao@oakland.edu</a></td>
<td><a href="mailto:cronn@oakland.edu">cronn@oakland.edu</a></td>
</tr>
<tr>
<td>Office Hours:</td>
<td>Noon – 1:00 PM TR or</td>
<td>By appointment, especially prior or after class</td>
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<td>by appointment</td>
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Catalog Course Description

Interdisciplinary physical science course for non-science majors to enhance their scientific literacy and experience the scientific approach to problem solving in active-learning classrooms and hands-on and computer laboratories. Modules on the science of everyday life, science of the microscopic world, and the earth and beyond. Satisfies the university general education requirement in the natural science and technology knowledge exploration area.

Course Objectives

1. Develop an understanding of, and be able to use in discussions and problem solving, these fundamental chemical concepts: molecules and chemical bonding; atomic and molecular structure; molecular shapes and polarity; chemical reactions and stoichiometry; solutions, dissolution, and precipitation; equilibrium and LeChatelier’s principle; electronic and vibrational spectra; and minimal contaminant levels for drinkable water.


3. Develop skills used by scientists for: constructing mental models using macroscopic, microscopic and symbolic representations; laboratory experimentation, decision-making, data analysis including use of spreadsheets and graphs, problem solving, and analogical and deductive reasoning.

4. Develop an understanding for the impact and implications on your life in the modern world of global warming, lasers, water quality, and the scientific method for problem solving including assessment of reliability, reproducibility, and uncertainty.

General Education Natural Science and Technology Learning Outcomes

The student will demonstrate:

- knowledge of major concepts from natural science or technology, including developing and testing of hypotheses; drawing conclusions; and reporting of findings through some laboratory experience or an effective substitute (Laboratory experiences are met by either a limited number of interactive experiences, collecting and interpreting raw data, or other effective experiences such as a virtual laboratory)

- how to evaluate sources of information in science or technology

Crosscutting Capacity: Critical thinking & Social awareness

Textbooks/Goggles

There are three course resources – the textbook, two modules booklets including Module Web tool CD, and the course notes packet that will be used in the course. You will also need to purchase goggles. All materials may be purchased at the OU Book Center or Textbook Outlet in the shopping at the northeast corner of Walton Blvd. and Squirrel Rd. across from the university except the course pack is only available at Textbook Outlet. Supplemental material will be made available on the web site.

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<tr>
<td>Required</td>
<td>Course pack for SCI 100</td>
<td>Available at Textbook Outlet as a</td>
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This course is not a standard lecture format course. The classroom sessions in 165 SFH will be highly interactive with several mini-lectures each class period, group worksheets, and personal responses to questions via individual remote devices. The course will be based on three modules. A module is centered on an interesting question that provides the context for understanding and applying specific physical science concepts. The modules are:

What Should We Do about Global Warming?
How Do Basic Physics Concepts Affect Your Daily Life? Mechanics, Heat, Electricity, Magnetism
Water Treatment: How Can We Purify Our Water?

You will work in peer groups. You will collect information through hands-on experiments, demonstrations, and computer simulations. These observations are used to answer session questions, leading to answers to the more complex module question. It is important to answer all assigned session questions to develop a complete understanding of the module question.

The textbook, two modules and CDs will be the resources for the course. You may also find yourself often seeking additional information from the internet. Readings will be assigned to help answer session questions. WebCT will be used extensively. It is important to log on to WebCT on a regular basis for class announcements, assignments, discussion questions, communication with the instructors, and sample quizzes. The Module Web Tools CD includes computer simulations and movies of experiments to help answer session questions. The Module Web Tools CD is also available through the WebCT site.

**Course Philosophy**

1. Be flexible. The learning style used in this class is likely different from traditionally taught courses you have taken before.
2. Never Miss Class
3. Come to Class Ready to Think
4. Do Not Try to Memorize Everything; Attempt to Understand the Concepts
5. Do Your Homework
   a. Do Pre-Class Assignments before Class
   b. Do Your Post-Class Assignments As Soon After Class as Possible
   c. Do Not Wait Until the Last Minute
   d. Do Not "Take a Week Off"
6. If your quiz/test results are low, seek help immediately from the professors, teaching assistant, and/or peer study partners.
Course Policies and Procedures

Grading

Grades will be based on scores received on module quizzes, lab assignments, class and individual homework assignments, culminating exercises for each module, and responses to classroom questions using a SRS (Student Response System by iClicker). For each module 30-40% of the points will be assigned to the module quiz and 25-30% to laboratory assignments. The points by category for the three modules are expected to be as follows:

<table>
<thead>
<tr>
<th>Module</th>
<th>Quiz</th>
<th>Lab</th>
<th>HW</th>
<th>ICE</th>
<th>Culm. Exer.</th>
<th>SRS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Global Warm</td>
<td>125</td>
<td>125</td>
<td>50</td>
<td>40</td>
<td>50</td>
<td>10</td>
<td>400</td>
</tr>
<tr>
<td>Physics of Life</td>
<td>175</td>
<td>150</td>
<td>60</td>
<td>35</td>
<td>None</td>
<td>30</td>
<td>450</td>
</tr>
<tr>
<td>Water Quality</td>
<td>150</td>
<td>150</td>
<td>30</td>
<td>56</td>
<td>essay 25</td>
<td>14</td>
<td>500</td>
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Grades will be assigned using the following grading scale. The maximum points may be adjusted if there are components for which no student receives the maximum points.

<table>
<thead>
<tr>
<th>% Max. Points</th>
<th>Grade</th>
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<tbody>
<tr>
<td>45</td>
<td>1.0</td>
</tr>
<tr>
<td>55</td>
<td>2.0</td>
</tr>
<tr>
<td>65</td>
<td>2.5</td>
</tr>
<tr>
<td>75</td>
<td>3.0</td>
</tr>
<tr>
<td>85</td>
<td>3.5</td>
</tr>
<tr>
<td>95</td>
<td>4.0</td>
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Academic Misconduct

The University’s regulations that relate to academic misconduct will be fully enforced. You are expected to give full credit to all external sources used. Any student suspected of cheating by copying on homework, labs, or exams, by changing answers on exams after they have been scored, by having another person take an exam for them, by obtaining exam questions prior to the exam, using another student’s iClicker because they are absent, or by plagiarism will be referred to the Academic Conduct Committee. Students found guilty of academic misconduct face suspension or permanent dismissal.

Professional Behavior

Classroom Courtesy: The instructors of this course have a strong commitment to the development and maintenance of an instructional climate that supports respect for everyone in the classroom. Your enrollment in this course requires that you will treat your fellow classmates and course instructor with respect. The instructor reserves the right to adjust course grades for disrespectful behavior.

Professional Behavior: An instructor will schedule a discussion privately with any student exhibiting unacceptable classroom behavior. Depending on the severity of the behavior, a “Concerns” form may be filed with the student’s OU file.

Cell Phones: Cell phones are to be turned off during class period. You may not leave the classroom to answer phone calls and return.

Accommodation
Special Consideration: Students who may require special considerations should work with Disabilities Support Services and the instructor to arrange accommodation.
## Tentative Schedule

### Module 1 – What Should We Do About Global Warming?
- **Jan. 4**  
  Thurs.  
  Class: Introduction, WebCT, graphs
- **Jan. 9**  
  Tues.  
  Class: Graphs, visible & IR spectra
- **Jan. 11**  
  Thurs.  
  Start atomic structure, etc.
- **Jan. 16**  
  Tues.  
  Lab: Visible spectrum
- **Jan. 18**  
  Thurs.  
  Class: atomic structure, Lewis structures, VSEPR
- **Jan. 23**  
  Tues.  
  Lab: Molecular models and infrared spectra
- **Jan. 25**  
  Thurs.  
  Class: Chemical equations and stoichiometry
- **Jan. 30**  
  Tues.  
  Lab: CO$_2$ in breath, discuss quiz and essay
- **Feb. 1**  
  Thurs.  
  Class: global warming quiz

### Module 2 – How Do Basic Physics Concepts Affect Your Daily Life? Mechanics, Heat, Electricity, Magnetism
- **Feb. 1**  
  Thurs.  
  Class: Introduction to physics of life module
- **Feb. 6**  
  Tues.  
  Class: Kinematics in one dimension, motion in vertical plane, gravity
- **Feb. 8**  
  Thurs.  
  Class: Work, Kinetic Energy and different forms of potential energy
- **Feb. 13**  
  Tues.  
  Lab 1: Measuring the acceleration of Dynamic cart and Acceleration due to gravity
- **Feb. 15**  
  Thurs.  
  Class: Newton’s laws of motion
- **Feb. 20**  
  Tues.  
  Lab 2: Measuring the velocity of a Dynamic cart and Verification of Newton’s second law
- **Feb. 22**  
  Thurs.  
  Class: Momentum, collisions and Impulse momentum theorem
- **March 6**  
  Tues.  
  Lab 3: Electrical circuits: Measurement of electrical current, voltage and power
- **March 8**  
  Thurs.  
  Class: Static electricity, force between charged objects and introduction to magnetism
- **March 13**  
  Tues.  
  Class: Electrical circuits, relation between current, voltage and resistance And Ohm’s law.
- **March 15**  
  Thurs.  
  Module Quiz

### Module 3 – Water Treatment: How Can We Purify Our Water?
- **March 15**  
  Thurs.  
  Class: Introduction to water treatment E1A, C, D Intro to culminating project
- **March 20**  
  Tues.  
  E3A Developing Ideas E3B, D
- **March 22**  
  Thurs.  
  E2B – 2F preparation, pre-lab questions
- **March 27**  
  Tues.  
  E2B – 2F Lab – measure concentrations in water samples
- **March 29**  
  Thurs.  
  E4C – equilibrium in class, then computer lab with mobile computers
- **April 3**  
  Tues.  
  E4E, E5A, B in-class demonstration
- **April 5**  
  Thurs.  
  Demonstration of lab techniques and practice on lab calculations
- **April 10**  
  Tues.  
  E6B, C, D Remediation of water samples
- **April 12**  
  Thurs.  
  E7A, B, C
- **April 17**  
  Tues.  
  Consultant groups present results
- **April 20**  
  Friday  
  Module quiz **12:00 noon – 3:00 PM**