Basic Information

<table>
<thead>
<tr>
<th>Departments:</th>
<th>Chemistry and Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Prefix:</td>
<td>SCI 100: Section 001</td>
</tr>
<tr>
<td></td>
<td>(CRN 46958)</td>
</tr>
<tr>
<td>Course Title:</td>
<td>Physical Science in Life, the World and Beyond</td>
</tr>
<tr>
<td>Credit Hours:</td>
<td>4</td>
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</tbody>
</table>

The course meets Mondays and Wednesdays from 5:30 – 7:17 PM. Wednesday sessions will be held in 172 SFH. Most Monday sessions will be laboratory sessions held in 230-240 HHS or 331-335 HHS.

Web Site

Address: [http://moodle.oakland.edu](http://moodle.oakland.edu)
There is a web site for this class. It will be necessary for you to use the site. See the separate document for how to access and use the site.

Instructor Information

<table>
<thead>
<tr>
<th>Names:</th>
<th>Rao Bidhanapally</th>
<th>Joel Russell</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offices:</td>
<td>270 HHS</td>
<td>244 SEB</td>
</tr>
<tr>
<td>Mailboxes:</td>
<td>Dept. of Physics 190 SEB</td>
<td>Dept. of Chemistry 264 SEB</td>
</tr>
<tr>
<td>Phones:</td>
<td>(248) 370-4872</td>
<td>(248) 370-2086</td>
</tr>
<tr>
<td>E-mail Addresses:</td>
<td>Moodle email or <a href="mailto:burao@oakland.edu">burao@oakland.edu</a></td>
<td>Moodle email</td>
</tr>
<tr>
<td>Office Hours:</td>
<td>By appointment.</td>
<td>Mon. &amp; Wed. 4:00-5:00 Tue. 2:00-3:00 Thurs. 1:00-2:00 Or by appointment</td>
</tr>
</tbody>
</table>
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.
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. Most materials may be purchased at the OU Book Center in the Oakland Center. The course pack is only available at Textbook Outlet in the shopping center at the northeast corner of Walton Blvd. and Squirrel Rd. across from the university. Supplemental material will be made available on the web site.

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<thead>
<tr>
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<tbody>
<tr>
<td>Required</td>
<td>Course pack for SCI 100</td>
<td></td>
<td>Available at Textbook Outlet as a custom-published course pack.</td>
</tr>
<tr>
<td>Required reading</td>
<td>Selected material from Physical Science fifth edition by Tillery</td>
<td></td>
<td>Available as a custom-published textbook, CD included – ISBN 007423322X</td>
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</table>

This course is not a standard lecture format course. The classroom sessions in 172 SFH will be highly interactive with several mini-lectures each evening, 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. Readings will be assigned to help answer session questions. Moodle will be used extensively. It is important to logon to Moodle on a regular basis for class announcements, assignments, discussion questions, and 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 Moodle site.

### How to Succeed in SCI 100

1. **Never Miss Class**
2. **Come to Class Ready to Think**
3. **Do Not Try to Memorize Everything; Attempt to Understand the Concepts**
4. **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"
5. **If your quiz/test results are low, seek help immediately from**
   the professors, teaching assistant, and/or peer study partners
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 PRS (Personal Response System). 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. Exercise</th>
<th>PRS</th>
<th>Total</th>
</tr>
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<tbody>
<tr>
<td>Global Warm</td>
<td>125</td>
<td>100</td>
<td>70</td>
<td>40</td>
<td>50</td>
<td>15</td>
<td>400</td>
</tr>
<tr>
<td>Physics of Life</td>
<td>175</td>
<td>150</td>
<td>75</td>
<td>65</td>
<td>35</td>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>Water Quality</td>
<td>135</td>
<td>175</td>
<td>55</td>
<td>40</td>
<td>80</td>
<td>15</td>
<td>500</td>
</tr>
</tbody>
</table>

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>45</th>
<th>55</th>
<th>65</th>
<th>75</th>
<th>85</th>
<th>95</th>
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<tbody>
<tr>
<td>Grade</td>
<td>1.0</td>
<td>2.0</td>
<td>2.5</td>
<td>3.0</td>
<td>3.5</td>
<td>4.0</td>
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</table>

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, or by plagiarism will be referred to the Academic Conduct Committee. Students found guilty of academic misconduct face suspension or permanent dismissal.
## Tentative Schedule

**Module 1 – What Should We Do About Global Warming?**

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sept. 5</td>
<td>Wed.</td>
<td>Class/Lab: Intro. global warming module, graphs (1A-1C)</td>
</tr>
<tr>
<td>Sept. 10</td>
<td>Mon.</td>
<td>Class/Lab: Visible and IR spectra (2)</td>
</tr>
<tr>
<td>Sept. 12</td>
<td>Wed.</td>
<td>Class: atomic structure, Lewis structures, VSEPR (3A,3B)</td>
</tr>
<tr>
<td>Sept. 17</td>
<td>Mon.</td>
<td>Lab: Molecular models and infrared spectra (3B,3C)</td>
</tr>
<tr>
<td>Sept. 19</td>
<td>Wed.</td>
<td>Class: Chemical equations and stoichiometry (5A-5C)</td>
</tr>
<tr>
<td>Sept. 24</td>
<td>Mon.</td>
<td>Lab: CO₂ in breath, discuss quiz and essay (6A)</td>
</tr>
<tr>
<td>Sept. 26</td>
<td>Wed.</td>
<td>Class: Module summary and discussion</td>
</tr>
<tr>
<td>Oct. 1</td>
<td>Mon.</td>
<td>Class: global warming quiz (6:30-7:17)</td>
</tr>
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**Module 2 – How Do Basic Physics Concepts Affect Your Daily Life? Mechanics, Heat, Electricity, Magnetism**

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oct. 1</td>
<td>Mon.</td>
<td>Class: Intro. to physics of life module (5:30-6:30)</td>
</tr>
<tr>
<td>Oct. 3</td>
<td>Wed.</td>
<td></td>
</tr>
<tr>
<td>Oct. 8</td>
<td>Mon.</td>
<td></td>
</tr>
<tr>
<td>Oct. 10</td>
<td>Wed.</td>
<td></td>
</tr>
<tr>
<td>Oct. 15</td>
<td>Mon.</td>
<td></td>
</tr>
<tr>
<td>Oct. 17</td>
<td>Wed.</td>
<td></td>
</tr>
<tr>
<td>Oct. 22</td>
<td>Mon.</td>
<td></td>
</tr>
<tr>
<td>Oct. 25</td>
<td>Wed.</td>
<td></td>
</tr>
<tr>
<td>Oct. 29</td>
<td>Mon.</td>
<td></td>
</tr>
<tr>
<td>Oct. 31</td>
<td>Wed.</td>
<td></td>
</tr>
<tr>
<td>Nov. 5</td>
<td>Mon.</td>
<td>Class: Physics of life module quiz (6:30-7:17)</td>
</tr>
</tbody>
</table>

**Module 3 – Water Treatment: How Can We Purify Our Water?**

<table>
<thead>
<tr>
<th>Date</th>
<th>Day</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov. 5</td>
<td>Mon.</td>
<td>Class: Intro. to water treatment module (5:30-6:30)</td>
</tr>
<tr>
<td>Nov. 7</td>
<td>Wed.</td>
<td>Class: Composition of drinking water supplies (1A,1C,1D)</td>
</tr>
<tr>
<td>Nov. 12</td>
<td>Mon.</td>
<td>Lab: Solubility of ionic and molecular compounds in water (3A)</td>
</tr>
<tr>
<td>Nov. 14</td>
<td>Wed.</td>
<td>Class: Factors affecting solubility (3B,3D), analysis tech. (2B-2F)</td>
</tr>
<tr>
<td>Nov. 19</td>
<td>Mon.</td>
<td>Lab: Analysis of water samples (2B-2F)</td>
</tr>
<tr>
<td>Nov. 21</td>
<td>Wed.</td>
<td>Class/Computer Lab: Chemical equilibrium (4B,4C,SMV:Chem)</td>
</tr>
<tr>
<td>Nov. 26</td>
<td>Mon.</td>
<td>Class: Chemical equilibrium (4D,4E,5A,5B)</td>
</tr>
<tr>
<td>Nov. 28</td>
<td>Wed.</td>
<td>Class: Remediation by precipitation (5C,5D) Techniques (6B-6D)</td>
</tr>
<tr>
<td>Dec. 3</td>
<td>Mon.</td>
<td>Lab: Remediation of water samples to remove impurities</td>
</tr>
<tr>
<td>Dec. 5</td>
<td>Wed.</td>
<td>Class: Module summary and discussion</td>
</tr>
<tr>
<td>Dec. 12</td>
<td>Wed.</td>
<td>Module quiz (7:00-8:00)</td>
</tr>
</tbody>
</table>