

**Introduction to Process Technology for ESL Students**  
**July 5, 2007 – August 16, 2007**

Week	Learning Outcomes	Assignments/Handouts
1 Administer Pre-test	<ol style="list-style-type: none"> <li>1. Determine students' current knowledge base.</li> <li>2. Adjust curriculum as necessary to address significant knowledge gaps.</li> </ol>	None
2 Mathematics	<ol style="list-style-type: none"> <li>1. Learn units of measure for length, area, and volume.</li> <li>2. Learn to calculate perimeter and area of a rectangle and a circle.</li> <li>3. Learn how to manipulate units of measure (e.g., inch, millimeter), mathematically along with numbers.</li> <li>4. Convert selected units of measure between the scientific and British systems and understand the mathematical basis for conversion factors.</li> <li>5. Learn how to convert between Centigrade and Fahrenheit temperature scales.</li> <li>6. Enter numbers and units into a simple algebraic equation and calculate the unknown quantity.</li> </ol>	<ol style="list-style-type: none"> <li>1. Table of common conversion factors. H-1.</li> </ol>
3 Chemistry Concepts	<ol style="list-style-type: none"> <li>1. Review math concepts from Week 1 with emphasis on understanding conversion factors and manipulation of units. Hold a class question/answer session to review previous material.</li> <li>2. Understand the relationship between fraction, decimal, and percentage. Work an example problem.</li> <li>3. Learn the components of the atom and elements.</li> <li>4. Learn how elements combine to form molecules, compounds, and mixtures. Develop lists of common compounds and mixtures.</li> <li>5. Learn the atomic structure of water.</li> <li>6. Understand the basic properties of solids liquids, and gases and how these properties are different for the three states of matter..</li> </ol>	<ol style="list-style-type: none"> <li>1. A "picture" of an atom and a molecule.</li> </ol>

	7. Understand the relationship between simple molecular structure and the ability of compounds to form mixtures.	
4 Process Variables	<ol style="list-style-type: none"> <li>1. Work review problems to reinforce perimeter and area calculations for rectangle and circle.</li> <li>2. Perform volume calculations and units of measure.</li> <li>3. Present concept of square root and demonstrate method to calculate square root of a number. Relate this concept to area calculations. Students solve a square root problem as a class.,</li> <li>4. Understand the concept of a “process” and how “man-materials-machines-methods” combine to make a process work.</li> <li>5. Understand the concept of a process variable and why variables must be controlled within a process.</li> <li>6. As a class exercise, the students identify the process variables and process steps for the process of washing/drying clothes using an automatic washer and dryer.</li> </ol>	<ol style="list-style-type: none"> <li>1. Draw the process and identify process variables for making a cake using packaged cake mix.</li> </ol>
5 Process Variables (continued); Fluid Dynamics; Miscellaneous	<ol style="list-style-type: none"> <li>1. Class question and answer session to review previous lessons. Work a square root problem</li> <li>2. Discuss four important process variables (pressure, temperature, level, and flow rate) and how they affect most processes.</li> <li>3. Hold class discussion on how the students use these process variables daily in their homes and jobs.</li> <li>4. Introduce the topic of fluid flow by relating it to a residential plumbing system. Discuss material density and viscosity to prepare students for understanding fluid dynamics.</li> <li>5. Learn basics of fluid dynamics, including energy sources, pressure drop, velocity, friction, area, fluid</li> </ol>	<ol style="list-style-type: none"> <li>1. Drawings of centrifugal pumps and reciprocating compressors.</li> <li>2. Handouts containing information on various types of pumps and compressors.</li> </ol> <p>H-2,H-3,H-4,H-5, H-6.</p>

	<p>density, fluid viscosity, and kinetic energy.</p> <ol style="list-style-type: none"> <li>Learn basic operation of centrifugal pumps and reciprocating compressors.</li> <li>Discuss miscellaneous items that are important to the process industries – catalysts, insulation, electrical safety.</li> </ol>	
<p>6 Piping, equipment, and safety</p>	<ol style="list-style-type: none"> <li>Review fluid dynamics.</li> <li>Hold a question and answer session with class as a review of previous session.</li> <li>Respond to student question about how striped toothpaste is possible. Explain how engineers used fluid dynamics to design the toothpaste tube.</li> <li>Show examples of various components in piping systems, i.e., valves, piping, fittings, flanges, gaskets. Discuss typical applications for these components.</li> <li>Discuss potential safety and environmental concerns regarding certain chemicals.</li> <li>Class discussion on finding safety and environmental information on a typical MSDS (gasoline). Explain how to obtain a MSDS.</li> </ol>	<ol style="list-style-type: none"> <li>Piping components.</li> <li>Making striped toothpaste. H-7</li> <li>MSDS for gasoline,. H-8.</li> </ol>
<p>7 Process Technician job description, safety regulations, environmental regulations, lockout- tagout, personal protective equipment</p>	<ol style="list-style-type: none"> <li>Hold class question and answer session regarding any topics that had been covered.</li> <li>Talkd with the students about the technician’s role in operating a process unit. Emphasize safety, environmental protection and compliance, adherence to procedures, and documentation of tasks.</li> <li>Discuss the basics of lockout/tagout.</li> <li>Administer pre-test that was given at the start of the course.</li> </ol>	<ol style="list-style-type: none"> <li>PPE examples.</li> </ol>
<p>8</p>	<p>With cooperation of company personnel,</p>	

Field Trip	take the students on a tour of the Eastman Chemical Company Texas Operations site. Pointout equipment that had been studied. The tour will include time in a control room where the students can talk with operations personnel and observe them doing their jobs.	
------------	--	--

Written by: William C. Anderson  
10 Sept. 2007