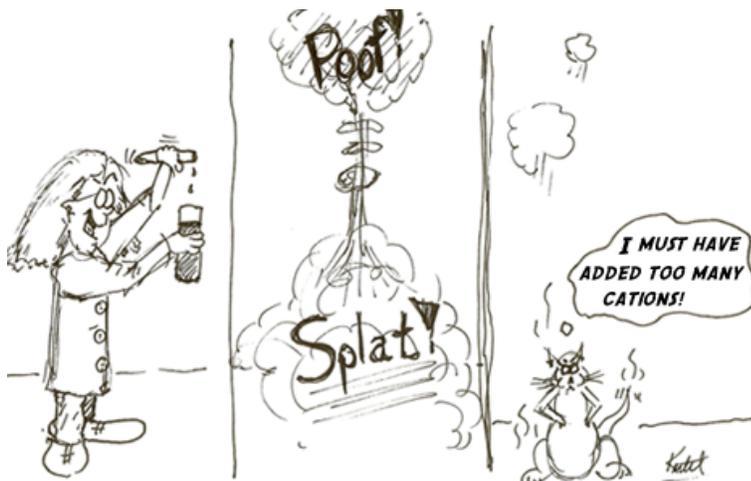


## Chemistry 121

Welcome: [Log In](#) | [Syllabus](#) | [Learning Outcomes](#) | [Grading](#) | [One Book](#) | [Blog](#)



**Welcome** to Chemistry 121. I am currently teaching section FG which meets Tuesdays and Thursdays from 8:30 to 11:35 in room 3162. Please check this website often for updates.

### Course Catalog Description

#### CHEMISTRY 073 0121 - Basic Chemistry I

Principles of general inorganic chemistry, including properties of matter, dimensional analysis, fundamentals of stoichiometry, interpretation of the periodic table, nomenclature and introduction to solution chemistry and commonly used concentration units. Writing assignments, as appropriate to the discipline, are part of the course. Prerequisites: Eligibility for Mathematics 118 or higher. 2 lecture hours and 4 lab hours per week based on sixteen weeks. Credit Hours: 4

#### Students the Course is Expected to Serve

Chemistry 121 is designed mainly for students who have not had high school chemistry in the last few years and who do not have the necessary mathematics preparation or familiarity with the periodic table to take Chemistry 201 - General Chemistry I. Students who plan to apply for the Associate Degree Nursing Program and student who wish to improve their science background compose the majority of students in this course. It also counts as 4 credit hours of laboratory science in the physical sciences when applied towards the science requirement in the general education core.

#### Illinois Articulation Initiative (IAI)

**Note:** Chemistry 121 has an IAI code of P1 902L. You can learn more about IAI by visiting [iTransfer](#).

#### Instructor



Prof J. Walker  
 Department Chair, Physical Science and Engineering  
 jwalker@ccc.edu  
 Office: 3824/3826 (Main Office)  
 Phone: (773) 907-4698  
 Website: [JustOnly.com](#)

Office Hours: Monday, Tuesday, Wednesday, Thursday afternoons (1:00 p.m. to 5:00 p.m.) by appointment. You may call (872) 216-1317 to leave messages.

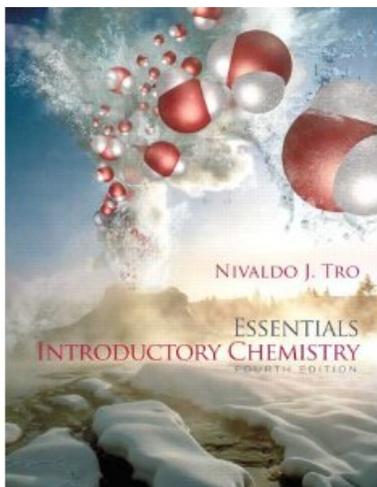
I've been teaching at Truman College in Uptown, Chicago since 1982. Around the year 2000 I spent six years in administration, a valuable experience but ultimately not the path I wanted to follow. I have a master's degree in Chemistry from University of

Illinois, Urbana-Champaign. I hold certificates in computer repair (A+), Certified Internet Webmaster (CIW), and Internet Security (CISSP). I have a variety of interests: Chemistry, Web Development, Physical Sciences (all of them), Urban Gardening, and Education. I continue to explore a variety of techniques in the classroom in a blended: high tech - high touch approach. Technology is a great tool for teaching but it does not take the place of tactile, hands-on learning that occurs when we make something for ourselves. I use [laboratory notebooks](#) or journals in most of my

classes. I love to do demonstrations in class. What I recommend for every student is to remember what it felt like to have the curiosity of a child - and find that curiosity again! The world is truly amazing.

### Required Course Materials

#### Textbook



Introductory Chemistry 4th. Ed. by Nivaldo J. Tro

#### Laboratory Notebook



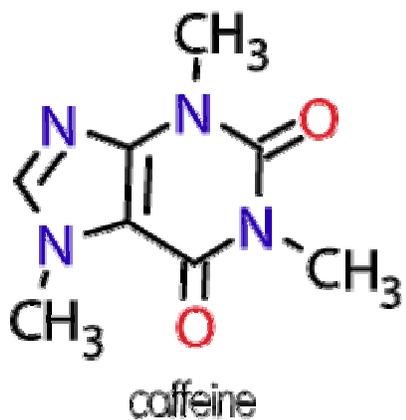
No specific brand is required but the pages **MUST BE BOUND**. Spiral notebooks may **NOT** be used. I prefer quad rule pages (graph paper) but any kind of pages are fine - blank, lined etc. It is important to have a firmly bound book for keeping a permanent record of laboratory observations, data, summaries, analyses and reflections. The laboratory notebook should not have perforated pages that can be removed. [View Sample Pages](#)

*Note: There is no laboratory textbook to purchase for this class but you will need to print laboratory assignments from the Internet.*

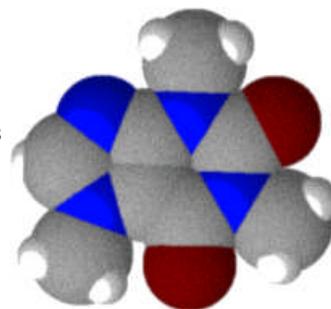
#### Calculator

You will need a calculator and should bring it with you to every class. It should be able to use scientific notation.

#### Favorite Molecule



Caffeine has the molecular formula  $C_8H_{10}N_4O_2$  and acts as a stimulant in humans. It is found in many beverages such as coffee, tea, cola and energy drinks. The name comes from the Italian term for coffee, caffè. Read what Wikipedia has to say about [caffeine](#).



**Truman College Mission Statement**

*"Our Mission dedicates us to deliver high-quality, innovative, affordable and accessible educational opportunities and services that prepare students for a rapidly changing and diverse global economy."*

**FERPA**

FERPA (Family Educational Rights and Privacy Act) is a federal law that protects the privacy of student educational records: <http://www.ed.gov/policy/gen/guid/fpco/ferpa/index.html>. Faculty cannot reveal information about students, or discuss student records over the phone or unsecure e-mail. CCC student e-mail meets FERPA requirements.

**Student Services**

The [Student Services Department](#) provides a broad range of services to assist students in achieving their academic and life goals.

**Students with Disabilities**

The [Truman College Disability Access Center \(DAC\)](#) verifies needs pursuant to the American Disabilities Act (ADA), determines student academic accommodations, and issues accommodation letters. Phone number: (773) 907-4725. Linda Ford is the director. The DAC is located in Room 1435, Main Bldg.

**Tutoring Center**

The [tutoring center](#) is located in room 177, Larry McKeon Student Services Building, (773) 907-4785 or (773) 907-4790.

**TRIO Student Support Services**

[TRIO](#) is for low-income students, first generation college students, or students with disabilities who need academic support: (773) 907-4797, Room 1435, Main Bldg. Registration is required at the start of each semester.

**Student Success and Leadership Institute (SSLI)**

[SSLI](#) is for students who need various other support services to achieve their educational goals: (773) 907-4737, Room 1435, Main Bldg.

**Wellness Center**

The [Wellness Center](#) provides a variety of services at no cost for students including counseling, crisis intervention, support groups and more. (773) 907-4786, Room 1946, Main Bldg.

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# Syllabus

## CHEMISTRY 121 COURSE OUTLINE/SYLLABUS

Date	Topic	Text Reference
<b>Week 1</b> Aug. 27	<b>An Introduction to Chemistry:</b> Scientific Method, Classifying Matter	Chapter 1 and Chapter 3 (to 3.4)
<b>Week 1</b> Aug. 29	<b>Measurement:</b> Metric System, Significant Figures	Chapter 2
<b>Week 2</b> Sept. 3	<b>Measurement:</b> Scientific Notation	Chapters 2
	<b>LAB:</b> Equipment Inventory; Getting Started in the Laboratory; Drawing Laboratory Apparatus;	
<b>Week 2</b> Sept. 5	<b>Dimensional Analysis:</b> Metric to Metric conversions, Metric to English conversions, English to Metric conversions, Temperature	Chapter 2
	<b>LAB:</b> Measurement; Temperature;	
<b>Week 3</b> Sept. 10	<b>Elements and Compounds:</b> Symbols and Names, Periodic Table	Chapter 4
	<b>LAB:</b> Accuracy and Precision;	
<b>Week 3</b> Sept. 12	<b>Density:</b> Calculating Density, Interpreting Density Values, Mass by Difference, Volume by Difference, Difference between Mass and Weight	Chapter 2
	<b>LAB:</b> Density;	
<b>Week 4</b> Sept. 17	<b>Properties of Matter:</b> Physical and Chemical Changes Energy and Heat	Chapter 4
	<b>LAB:</b> Separation of Salt and Sand	
<b>Week 4</b> Sept. 19	<b>Problem Solving and Review</b>	Chapters 1,2,4
	<b>LAB:</b> Chocolate Mousse and Carbonated Water; Observing Chemical and Physical Changes <b>ACTIVITY:</b> Element Business Cards	
<b>Week 5</b> Sept. 24	<b>Energy:</b> Heat Transfer and Specific Heat	Chapter 3
	<b>LAB:</b> Caloric Energy of a Cheeto	
<b>Week 5</b> Sept. 26	Energy: Heat Transfer Problems	Chapter 3
	<b>LAB:</b> Identification of an Unknown Metal	
<b>Week 6</b> Oct. 1	<b>Exam One (1-4)</b>	Chapters 1,2,3,4
<b>Week 6</b> Oct. 3	<b>Nomenclature of Inorganic Compounds:</b> Polyatomic Ions, Binary compounds, Acids, Covalent Compounds	Chapter 5
	<b>Formal Lab Report Due and Lab Notebooks will be collected.</b>	
<b>Week 7</b> Oct. 8	<b>Modern Atomic Theory:</b> Quantum Mechanics and Periodic Trends	Chapter 9
<b>Week 7</b> Oct. 10	<b>Chemical Bonding</b> Lewis Structures, Covalent Bonds, Molecular Structure	Chapter 10
<b>Week 8</b> Oct. 15	<b>Molecular Geometry</b>	Chapter 10
	<b>LAB:</b> Molecular Geometry and Shape	
<b>Week 8</b> Oct. 17	Review and Preparation for Exam Two	
	<b>LAB:</b> Hydrates	
<b>Week 9</b> Oct. 22	<b>Exam Two (5,9,10)</b>	
	<b>Quantitative Composition of Compounds:</b> Mole, Molar Mass, Percent Composition	Chapter 6
<b>Week 9</b> Oct. 24	<b>Reactions:</b> Single Replacement Reactions	Chapter 7
	<b>LAB:</b> Single Replacement Reactions	
<b>Week 10</b> Oct. 29	<b>Quantitative Calculations:</b> Mole, Molar Mass	Chapter 8

**Week 10 Stoichiometry:** Mole-Mole, Mole-Mass, Mass-Mass  
Oct. 31

Chapter 8

**LAB:** Metathesis Reactions

**Week 11 Stoichiometry:**

Nov. 5 Mole-Mole  
Mole-Mass  
Mass-Mass  
Percent Yield  
Limiting Reactants  
Stoichiometry Problem Solving

**LAB:** Stoichiometric Determination of the Formation of Copper (II) Oxide

<b>Week 11</b> Nov. 7	<b>Exam Three (6-8)</b>	
<b>Week 12</b> Nov. 12	<b>Gases</b> Kinetic Molecular Theory of Gases, Combined Gas Law, Ideal Gas Law	Chapter 11
<b>Week 12</b> Nov. 14	<b>LAB:</b> Preparation and Properties of Carbon Dioxide	
<b>Week 13</b> Nov. 19	<b>Gases</b> Gas Law Problem Solving Practice	Chapter 11
<b>Week 13</b> Nov. 21	<b>Solutions</b>	Chapter 13
<b>Week 15</b> Nov. 26	<b>Acid and Bases</b>	Chapter 14
<b>Week 14</b> Nov. 28	Thanksgiving Holiday	
<b>Week 15</b> Dec. 3	<b>Exam Four (11, 13, 14)</b>	
<b>Week 15</b> Dec. 5	Laboratory Notebooks Due! All assignments are due!	
<b>Week 16</b> Dec. 10	<b>Comprehensive Exit Exam</b>	
<b>Week 16</b> Dec. 12	Final Grade Conferences	

**Note:** All laboratories will be provided online as pdf files. You will need a *laboratory notebook*.

## Learning Outcomes and Course Objectives

### Learning Outcomes for Chemistry 121

At the completion of this course, the successful student will be able to:

- Compare and contrast the chemical behavior and physical properties of common substances.
- Predict and explain the electronic and molecular structures of common substances using models.
- Determine the qualitative and quantitative relationships between matter and energy involved in chemical or physical processes.
- Classify matter by its state and bonding behavior using the Periodic Table as a reference.
- Solve quantitative problems (stoichiometric) involving chemical formulas and equations.
- Formulate and test hypotheses.
- Perform laboratory experiments demonstrating safe and proper use of standard chemistry glassware and equipment.
- Record, graph, chart and interpret data obtained from experimentation.

### Course Objectives for Chemistry 121

Each course objective is cross referenced to a specific [General Education Goal \(GEG\)](#)

At the completion of this course, the successful student will be able to:

- Describe processes and procedures used in the scientific method; GEG3-5
- Differentiate terms such as observation, hypothesis, data, conclusion, theory; GEG3-5
- Explain how the use of the scientific method furthers scientific knowledge; GEG3-5
- Convert numbers in decimal notation to scientific notation and vice versa; GEG 2-5
- Convert temperature data to values in three scales: Celsius, Fahrenheit and Kelvin; GEG 2-5
- Explain why the Kelvin scale does not use negative numbers; GEG 3,4
- Convert quantities using common metric units: liters/milliliters, kilograms/grams/milligrams and meters/centimeters/millimeters; GEG3-5
- Demonstrate the use of significant figures in basic calculations: addition/subtraction, multiplication/division; GEG2-5
- Differentiate between precision and accuracy; GEG3-5
- Calculate one of the three quantities: mass, volume, density given the values for the other two; GEG4,5
- Determine mass by difference; GEG5
- Determine volume by difference; GEG5
- Measure the density of a sample of a solid or a liquid using available laboratory equipment; GEG2,4,5
- List the names and chemical symbols of at least 44 elements including Uranium (92) from the inner transition elements; GEG3,4
- List the names and formulas of common polyatomic ions; GEG3,4
- Given a positive and a negative ion - construct the formula of the ionic compound formed; GEG3,4
- Compare and contrast the difference between covalent and ionic compounds; GEG3,4
- Classify bonds in common compounds along the continuum of purely covalent to purely ionic; GEG3,4
- Differentiate between pure substances (elements and compounds) and mixtures (homogeneous and heterogeneous); GEG3,4
- Define colloid and give examples of colloids: foams, gels, smoke; GEG4
- Classify common elements as metals, non-metals and semi-metals and describe the properties of each class; GEG3,4
- Explain how the arrangement of electrons in an atom affects its bonding and chemical properties; GEG3,4
- Explain how the periodic table is arranged and what is indicated by rows, columns and various sections of the table; GEG3,4
- List electronic configurations for the first thirty-six elements; GEG3,4
- List the number of valence electrons for the first thirty-six elements (main group elements only); GEG4
- Construct simple Lewis Dot structures: water, methane, ammonia, boron trichloride, carbon dioxide, the diatomic molecules; GEG4
- Identify the alkali metals, alkaline earth metals, transition elements, halogens and noble gases on the periodic table; GEG3,4
- Convert between mass and moles; GEG3,4
- Convert between number of moles and number of formula units, molecules or atoms; GEG3,4
- Solve empirical formula problems; GEG4

- Classify chemical reactions into types: combination (synthesis), decomposition, single displacement (replacement) and double displacement (replacement) and combustion; GEG4
- Determine if a metal/metal ion in a reaction is being oxidized or reduced; GEG4
- Balance simple chemical reactions; GEG4
- Paraphrase the chemical properties of common ionic compounds and common covalent molecules; GEG3,4
- Recognize the formation of a precipitate or the evolution of a gas or heat during a chemical reaction performed in the laboratory; GEG5
- Construct chemical formulas for common compounds given the compound's name; GEG3
- Identify the name of compounds from its formula; GEG3
- Perform basic stoichiometric calculations to determine the quantity of products given various quantities of reactants; GEG4
- Solve limiting reactant problems; GEG4
- Solve percent yield problems; GEG4
- Compare and contrast the properties of the three basic states of matter: gas, liquid and solid; GEG3,4
- Explain the Kinetic Molecular Theory of Gases and list the assumptions of this theory; GEG3,4
- Calculate volume, temperature or pressure of a gas sample that undergoes changes in its initial conditions using the combined gas law; GEG4,5
- Apply the ideal gas law in solving chemical problems; GEG4
- Compare the solubility of various common compounds; GEG3,4
- Define the terms: solution, solute, solvent and solubility; GEG3
- Calculate the molarity of solutions; GEG4
- Identify and classify strong acids, hydroxide bases and neutral salts given the formula e.g. HCl is an acid, KOH is a base, NaCl is a neutral salt; GEG4,5
- Perform laboratory experiments that illustrate basic chemical principles; GEG1,2,4,5
- Demonstrate the careful recording of observations and data in the laboratory; GEG1-5
- Demonstrate a knowledge of laboratory safety; GEG1,2
- Demonstrate effective laboratory procedures such as transfer of solids, weighing of solids, pouring of liquids, measurement of liquid volume; GEG1,2
- Collect, organize and graph experimental data; GEG2-5
- Interpret experimental data and draw inferences from the data; GEG4,5
- Summarize the results of experimental observations and data; GEG4,5
- Give the names of common laboratory glassware: beakers, erlenmeyer flasks, graduated cylinders, test tubes. GEG3

### Teaching and Learning Goals Established by Truman College

Taking a course in Chemistry helps a student achieve all of the following general education goals. How this occurs is explained below.

- Communicate effectively in both written and oral forms  
Students will keep a laboratory notebook and learn to record careful observations, draw appropriate conclusions and reflect on what they have learned.
- Gather, interpret and analyze data  
Students will learn to collect data in the laboratory, create graphs, compare quantitative data and draw conclusions about the data obtained.
- Demonstrate the ability to think critically, abstractly and logically  
The Scientific Method is predicated upon deductive and inductive logical reasoning. Students will study applications of the scientific method to information gathered by the scientific community. Students will read articles about chemical discoveries. Abstract thinking is developed in many ways in chemistry from the use of symbols and models to the use of mathematics to solve a variety of problems.
- Work with a variety of technologies  
Students use computers, data acquisition equipment, microscopes, digital imaging devices, media, the Internet, podcasts, digital balances, all in the pursuit of scientific knowledge.
- Exhibit social and ethical responsibility  
This very serious goal is addressed on many levels in the chemistry course, from the discussion of the importance of careful and precise measurements that could affect the life of a patient to the discussion of what happened when the space ship Challenger exploded or a grain elevator explodes - we examine the role of responsible use of chemical knowledge.
- Perform productively in the workforce

Because Chemistry education is comprehensive in utilizing the body (kinesiology), the mind (both spatial and analytical reasoning) and the heart (looking at the connection of chemistry to the world) it is an excellent course to prepare individuals for the workforce.

- Demonstrate the ability to learn independently

Students are given independent projects to complete in the course. They are also given questions to research independently. Reporting these results to the class develops their ability to speak confidently to their peers.

- Gain awareness of their role in the global community

By discussing the way that chemistry is connected to other occupations and careers we develop student awareness about their career choice and its dependencies on a basic understanding of chemistry.

#### **General Education Goals Established by Truman College**

- **GEG1:** The student exhibits social and ethical responsibility and is aware of her or his place in the global community.
- **GEG2:** The student performs effectively in the workplace and has the ability to work and make effective use of a wide variety of current technologies.
- **GEG3:** The student communicates effectively in both written and oral formats.
- **GEG4:** The student demonstrates the ability to think critically, abstractly, and logically.
- **GEG5:** The student gathers, interprets and analyzes data.

#### **Physical Science and Engineering Departmental Learning Outcomes**

Upon graduation with an Associate degree from Truman College a student should be able to:

- Organize, analyze and interpret information and use the scientific method to make inferences.
- Exhibit knowledge of scientific concepts through written and oral communication.
- Demonstrate excellent laboratory skills and techniques including the proper use of relevant instruments and related technologies.
- Use the lexicon of science to explain abstract scientific concepts.
- Relate concepts learned in Physical Science and Engineering Department classes to real world situations.

## Grading Policy

**Your Grade** will be based on your work during laboratory (see details of this below)(30%), projects, examinations (best three of four) (30%), quizzes (best five) (20%), the course final exam / exit exam (15%) and class participation & homework (5%). **You must score at least 17/30 on the exit exam to receive a C or better in the course.**

DETAILS OF LABORATORY GRADING	
Component	Percentage
Laboratory is worth 30% of the overall grade in this course. The breakdown of the laboratory grade is as follows:	
Laboratory Notebook	60%
Laboratory Activities (models)	10%
Formal Laboratory Report	20%
Laboratory Performance	10%

GRADING SCALE	
Letter Grade	Percentage
A	90%
B	80%
C	70%
D	60%
F	below 60%
I	*Incomplete
ADW	**Administrative Withdrawal
NSW	***No Show Withdrawal

**\*I (Incomplete)** is a non-grade received by students who have **actively pursued** the course and are doing passing work at the end of the course, but who have not completed the course's final examination and/or other specific course assignments.

**\*\*ADW (Administrative Withdrawal)** is given to any student who is not **actively pursuing** the course objectives will be administratively withdrawn from the course at mid-term. An ADW will be given if a student does not complete at least 70% of all assignments; homework, exams, laboratories,

quizzes due prior to mid-term by the mid-term date. Since make up work is NOT permitted this means that attendance is extremely important and excessive absences will most likely result in an ADW.

**\*\*\*NSW (No Show Withdrawal)** is given to any student who misses the first two classes and does not discuss with me the circumstances of these absences will be given an NSW after the second class. A student who attends the first class and then fails to attend the next two classes and fails to discuss with me the circumstances of these absences will be given an NSW. Any student who misses more than half of the classes in the first two weeks of the term will also be given an NSW if we do not discuss the circumstances of these absences. In my discussion with you I will determine if it is feasible for you to successfully pursue the course objectives under whatever circumstances are causing you to miss class. Your success is very important to me and I know, from years of experience, that your success depends on your commitment and ability to attend the class and participate in all activities.

### General Policies

Please read the [general policies](#) carefully. Failure to follow [these policies](#) will be reflected in the class participation portion of your grade.

### Active Pursuit

**Active Pursuit** is defined as consistent attendance, communication with the instructor in person or by email about any absences, compliance with all policies, completion of assignments on time, communication with the instructor about any difficulties completing assignments on time, participating in class, taking quizzes and exams and performing laboratory experiments as assigned. Any student who misses two consecutive classes is at risk for being considered as not actively pursuing the class. The best strategy to handle any unforeseen circumstances is to communicate as soon as possible with the instructor.

### Make-Up Policy

**Make-Up work is not permitted under any circumstances.** This includes but is not limited to hospitalization, deaths in the family, illness, family emergencies. Life happens to everyone. This is why some quizzes and one exam are dropped from your grade with no penalties.

If circumstances arise that prevent you from actively participating in all aspects of this course please let me know. There is no substitute for attending classes regularly and on time. Please choose someone else in the class that will be able to exchange notes with you in the event either of you misses class. You are responsible for all missed announcements, assignments and class work. Please do not use the phrase "I didn't know" to excuse any missed work. Check the website often. Announcements and assignments are posted and updated regularly.

### Success in the Laboratory

**Laboratory Work:** You are expected to maintain a [detailed laboratory notebook](#) with observations, data, analysis and discussion of each demonstration and experiment. All data entries should be made in ink NOT pencil while you are in class. You will also be required to write a formal laboratory report for one of the experiments.

**Preparation:** Laboratory handouts are on the website. You will need to print copies of these for yourself. Please prepare for laboratory work ahead of time by carefully reading all instructions and taking notes in your laboratory notebook.

**Attire:** Please do NOT wear sandals or shorts to class. We carry out demonstrations and laboratory activities frequently. Some of my past students have elected to carry a second pair of shoes so that they could wear sandals for the rest of the day. That's fine. This rule is for your safety and you will NOT be permitted to carry out laboratory activities if you are not properly dressed.

### Methods of Assessment

During the first week of class students are given a knowledge probe assessment to determine how well they are prepared to take the course and their current knowledge of major course concepts. Throughout the course students will participate in a variety of assessment activities, quick questions on index cards, problem recognition tasks, opinion polls, skill drills, and common misconceptions assessment.

### Academic Integrity

There will be no tolerance for violations of academic integrity (e.g. plagiarism, cheating of any kind). Any violation will result in an "F" for the course.

#### TODAY'S DEMONSTRATION...



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