CHEMISTRY 120 /SYLLABUS /Spring 2012

(Printable .pdf file) [Translate and/or listen to Syllabus, or any Web page] Choice of over 50 languages.

Class Meetings * Texts & Materials * Topics * Homework * Grading * Absences * Lab * Safety * Internet

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Dr. Ron Rusay Office: ***PS 235, tel. 685-1230 x 2508;*** **Office Hours:** ***TTh 9:30-11:00, MW 10:00-11:00, Friday by appointment,*** **plus daily on-line, virtual office hours**

E-mail: rrusay@chemconnections.org ***or*** **rrusay@dvc.edu**

Course Homepage: **http://chemconnections.org/general/chem120/**

Prerequisite:CHEM - 108 or a score of 3, 4 or 5 on AP Chemistry Test or appropriate chemistry skill level demonstrated through Chemistry Diagnostic Test or equivalent;
MATH 120 or equivalent

An introduction to the fundamentals of chemistry including the topics: atomic theory, chemical reactions, bonding, structure, stoichiometry, gases, solutions, redox, thermochemistry, equilibrium, and acid-base chemistry. **Course Outline**: in **.pdf** format. **Student Learning Outcomes** .pdf.

PLEASE CONSIDER CAREFULLY: The teaching style of these two Chem 120 sections incorporates many innovations in undergraduate teaching methods and technological materials, which depart from, but are built upon traditional textbook-lecture centered science courses. The organization and approach are likely quite different from other courses that you are experienced in and comfortable with. The material will not be treated linearly as simple page turning in relation to the course textbook. You will be challenged personally: to find and access a variety of information, to appraise its value, and to use it constructively to answer questions, to solve problems, and to build knowledge. You will have various assets and tools available that go well beyond the textbook and lecture notes. You will need to decide how to use them effectively, and to develop your own personal learning plan accordingly. Not all knowledge in chemistry will be provided to you to repeat back accurately for a grade as you are accustomed to in most courses. Your plan will most likely be different than anyone else's. Without a plan that you can use productively and adjust as the course progresses, you will likely not meet your personal objectives. This metacognitive approach to teaching-learning will translate to any of your other courses and more importantly empower you to effectively address any topic in any discipline at anytime in your careers. **Certain student performance standards are uncompromising and unconditional.** ***You are expected to be prepared before coming to each class and lab. You are expected to attend each class and lab. You are expected to be punctual and arrive on time for each class and lab.You are expected to start promptly at the beginning of each class and lab. You are expected to be attentive throughout each class and lab.***

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1. Class Meetings: ***TTh 11:00-12:15 PS275***

Lab Meetings: Sec. 2933, *MW 11:00-1:50* ***PS201***
Sec. 2935, *MW 2:30-5:20* ***PS201***

Attendance is required in both lecture and laboratory. NOTE: College policy calls for dropping students from a course if 2 weeks of class or lab are missed.
Classes begin: *1/23*; **Holidays:** *2/17, 2/20, 4/2- 4/6*; ***Tentative Exam Dates:*** 2/23, 3/29, 5/15, 5/22 (FINAL)

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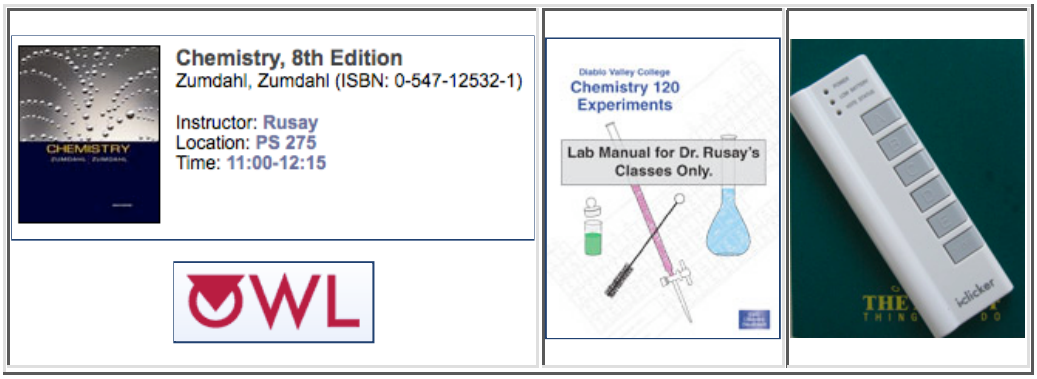
2. References and Equipment:

1: TEXT: Chemistry 8/e. Zumdahl & Zumdahl **(HIGHLY RECOMMENDED);** ***ALTERNATIVE:*** **http://chemwiki.ucdavis.edu PLEASE CONSIDER YOUR CHOICE CAREFULLY: Unless you are highly organized, disciplined, and can easily adapt to informational gaps, the Chem 120 ChemWiki, which is a work-in-progress and not completely finished, is not recommended. And, you should rely on the Zumdahl text as your course resource.**
2: OWL (Free) REQUIRED/MUST HAVE: Dr. R will provide an Access Code by e-mail in a reply to you.



3: LAB TEXT (REQUIRED); [NOTE: Lab MUST be this version, "Diablo Valley College **Chemistry 120 Experiments, Lab Manual for Dr. Rusay's Classes Only.", not the generic: Chemistry 120 Experiments]**

4: i<clicker (REQUIRED/MUST HAVE)

5: A lab notebook with numbered pages and tear out copy sheets. (REQUIRED/MUST HAVE)

6: Lab safety glasses with side shields or goggles. (REQUIRED/MUST HAVE)

7: Scientific Calculator. (REQUIRED)

OPTIONAL but recommmended: Student Solutions Guide for *Chemistry 8/e. Zumdahl & Zumdahl*

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3. Topics:

INTRODUCTION
1. Basic definitions
2. Systems of measurement-metric system
3. Significant figures, experimental error
SUBSTANCES AND MIXTURES
1. Atoms, molecules, and ions
2. Classification of matter
3. Balancing chemical equations
STOICHIOMETRY
1. Atomic and molecular weights
2. The mole concept
3. Empirical formula
4. Weight relationships
5. Molarity
CHEMICAL NOMENCLATURE
1. Naming ionic compounds, acids, and binary covalent compounds
REACTIONS OF AQUEOUS SOLUTIONS
1. Electrolytes and ionic equations
2. Oxidation-reduction reactions and balancing redox equations.
THERMOCHEMISTRY
1. Heat of reaction
2. Hess' Law
3. Enthalpies of formation
4. Bond energy
GASES
1. Gas laws
2. Kinetic molecular theory
3. Diffusion and effusion
4. Nonideal gases
LIQUIDS, SOLIDS, AND CHANGES OF STATE
1. Intermolecular forces
2. Properties of liquids
3. Phase changes
SOLUTIONS
1. The solution process
2. Concentration units
3. Colligative properties
CHEMICAL EQUILIBRIUM
1. The equilibrium constant
2. Equilibrium calculations
3. LeChatlier's principle
ACID-BASE THEORY
1. Arrhenius theory
2. Autoionization of water
3. pH
4. Bronsted-Lowry theory
5. Strong acids and bases
6. Weak acids and bases
7. Lewis theory
ACID-BASE EQUILIBRIUM
1. Equilibrium constants for weak acids, Ka, and weak bases, Kb
2. Salts and their corresponding Ka and Kbs
3. Equilibrium constants for polyprotic acids and their conjugate bases
4. Polyprotic acids
ATOMIC THEORY
1. Historical development
2. Quantum mechanical model
3. Electron configuration and chemical periodicity
CHEMICAL BONDING
1. Ionic and covalent bonding
2. Drawing Lewis structures
3. Electronegativity and polarity
4. Exceptions to the octet rule
5. VSEPR theory and molecular geometry
6. Valence bond model and hybridization
LABORATORY TECHNIQUES
1. Use of analytical balance
2. Use of volumetric glassware
3. Measurement of pH of aqueous solutions
4. Colorimetric analysis
5. Titration
6. Laboratory Notebook
7. Statistical analysis of data
8. Use of spreadsheets for processing data and generating graphs
9. Use of computers for data acquisition

SLO#1 Students completing the course will be able to develop and demonstrate appropriate chemical laboratory

techniques. Perform a titration to determine the concentration of an unknown component.
SLO#2 Students completing the course will be able to develop chemical problem solving skills as applied to chemical equilibrium.
SLO#3 Students completing the course will be able to explain and illustrate bonding in various compounds

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4. Class Preparation & Homework: Practice and staying current with the course content on a daily basis are essential to your success in this course of study. The amount of preparation, practice and time required will differ for each of you. A scientific study of students at Notre Dame University has shown that final grades in general chemistry are directly related to the amount of time students invest. In order to score well on exams & quizzzes, the questions to ask yourself while going through this experience are, "Can I teach this concept to someone else? And, can I recognize and correctly answer questions that are similar to the ones contained in the in-class clicker response questions, the worksheets, the on-line/textbook problems, and the class/lab activities?". Correlating the time related to your answer to these questions will provide an estimate of what you will likely need to invest. Exams will be designed to test content & concepts based on these materials. There will be periodic chapter/topic quizzes that will also be based on these materials. Order of emphasis is: **1)** (Refer to the course calendar page frequently) ***Read the on-line Class Slides & answer the i-clicker questions linked from the calendar before coming to each class. Take in class notes on the slides, questions and i-clicker answers***. **2)** ***Collaboratively complete all worksheets in a group with 1-3 partners*** **3)** ***Individually complete all on-line OWL questions***, **4)** as time allows and as your proficiency may require, do as many end of chapter textbook problems as possible; refer to the course assignments page and calendar page.

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5. Grading:
Attendance, i-clicker class participation, and Homework are valued at 10% of the TOTAL grade. The class portion of the grade is worth 65% of the total grade. It will be comprised of quizzes and worksheets, (which in total equal one exam), 3 in-class exams, and a final exam, which is equal to two hour exams. ***Tentative Exam Dates:*** 2/23, 3/29, 5/15, 5/22 (FINAL). A laboratory grade worth 25% will account for the remainder of the total grade. Final letter grades will be assigned based on: 90-100 A; 80-89 B; 65-79 C; 50-64 D;<50 F, using a normalized class average. ***NOTE:*** The DVC Code of Conduct will be strictly enforced. Cheating and plagiarism are unacceptable and will unconditionally result in a failing grade. *[Cell phones will not be allowed in rooms during exams and quizzes.]* *SEE: DVC Academic College Policies*

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6. Attendance / Tardiness / Absences:
On-time attendance at all scheduled class and lab meetings is unconditionally expected. ***It and homework are valued at 10% of the TOTAL grade***. If you arrive late for class or lab, you will be marked absent. Two late arrivals will be excused provided that you see Dr. R. immediately after class or lab. If you are to miss a class, quiz, exam or lab due to illness or other legitimate reason, you must advise Dr. R. prior to, or on the day that it is scheduled. If you do not do so, there will be no possibility of making up any missed work or of being excused from assignments, activities or the material presented. Notifying Dr. R. can be done by calling: 685-1230, ext. 2508 or leaving a message with the department secretary (ext. 2423) or sending an e-mail to Dr. R. ***If you miss a cumulative total of 8 laboratories and/or lectures regardless of the reasons, you may be dropped from the course.*** [*College policy provides for a student being dropped from a course if the student misses a cumulative total of two weeks of class/lab meetings*.]

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7. Laboratory:
The laboratory component of the course is essential to the overall course. ***A failing grade in the lab portion will result in a failing grade for the course.***

There will be experiments and activities that will be done on a group or team basis as well as indivdually. For each experiment, you are to prepare a pre-lab report prior to beginning a lab and a finished report on completion of the lab unless Dr. R. advises otherwise. You will be advised of the specific details for each lab.

Pre-Lab reports **must** be prepared prior to each scheduled lab. They **must** be in the following format, and include: **Title, Purpose, Procedure, Chemical Reactions** (where appropriate) and neatly organized, labeled, blank **Data Tables** with the **units** of measurement, eg. grams, mL, etc. and any **assigned questions**. Before you begin any lab, you **must** have Dr. R. initial the lab notebook page with the pre-lab report. If you miss a lab for any reason, Dr. R. must be advised the day of the lab or there will be no possibility of making up the lab.

The finished, complete Lab report **must** be in the following format, and **must** include all pertinent information **including unknown numbers** where unknowns are part of the experiment. Finished copies of the report will be collected. Lab Reports **must** be neat and legible. Significant deductions will be made for failure to follow any of these guidelines.

Title

Purpose:
A brief statement of the experiment's objective: Answer the question...what is your aim?

Procedure:
Include what you actually did so that someone else could repeat your work. The directions can be an outline of the actual conduct of the experiment in your own words. This section should be written in the past tense. Refer to the Lab instructions but do not copy them word for word.

Chemical Reaction(s):
In experiments with chemical reactions include, Complete, Balanced Chemical Equation(s); as many as appropriate.

Data:
All physical-chemical data used in the experiment (molecular weights, density, etc.) Should be provided in neat, well organized Tables of labeled experimental data with correct units and appropriate number of significant figures. If tables are provided in the Lab text, they can be appended. Raw data & observations should be included in this section.

Calculations:
Show how the numerical data was handled (i.e. the general mathematics): algorithms (formulas and equations), unit factor method, etc.and include one example. Do not include calculations for all trials, but do show average(s) and average deviation(s) for multi-trial experiments as required. Be as neat and concise as possible.

Results and Conclusions:
Re-state in one or two short sentences the results and your conclusions versus the intended purpose of the experiment. Use tables if appropriate.

Questions:
Answer any pre-lab and/or post-lab assigned questions.

Safety:

Laboratory safety is of the utmost importance to your well being and to your lab mates. Chemical exposure must be minimized through good lab practices. All wastes must be properly disposed of. Eye protection must be worn at all times. No one can work in the lab without an instructor being present. Only scheduled experiments are allowed. Bare feet, food, drink, eating, and conduct which places anyone at risk are unacceptable. Violation of safety standards can result in being dropped from the course.

Internet use and related:

The course will employ the Internet and Information Technologies in a variety of ways. This is NOT a course which teaches the Internet. The course is designed to use the Internet with its wealth of resources as a transparent tool to teach chemistry. Combined with good study practices, it will help you, the student, to better and more easily understand concepts and to make your learning experience broader and more successful.

Students are not required to have a computer or off campus access to a computer.

Free e-mail accounts are available. Each student **MUST** have their own e-mail account for class communication.

There will be no charges for the use of the Internet, computers or course related software.

The course will employ the Internet and Information Technologies in a variety of ways. The class will need the latest version of a Net browser for the Internet as well as other computer programs. All of these programs will be free for student use. (See Web Materials for a listing.) Since it is realized that not every student has a computer or off-campus access to a computer, computer related assignments are devised and time budgeted so that these assignments can be done while on the DVC campus by accessing the Internet from the Physical Science building's computers or other computers on the DVC campus that are available to DVC students.

Students are expected to visit regularly the course Homepage, particularly the calendar. The Homepage is the main tool for communicating information to the class. It includes all information on the course in addition to providing Internet links to many useful Web sites and materials for the course. The Homepage is a living course document. Information will be added as the course proceeds and past information will be archived.

If you do not already have e-mail, consult the Web Resource information linked from the Homepage for information on how to obtain your free e-mail account. Select a provider: Yahoo, Hotmail, G-mail, etc. and follow their on-line instructions.