

### Chem 103: Basic General Chemistry for Health Sciences

Instructor: Lawrence Duffy  
Office: 246 West Ridge Research Building (WRRB)  
Telephone: 474-7525  
Email: [lkduffy@alaska.edu](mailto:lkduffy@alaska.edu)  
Office Hours: W-F 8:30-10:00 am  
Lecture: MWF 3:30 – 4:30 pm, REIC 201  
Lab: See schedule (REIC 246)

**Course Description:** Fundamentals of chemistry including historical and descriptive aspects. Fulfills the laboratory part of the natural science requirement and prepares the student for Chem 104X.

**Philosophy:** At the same time health scientists and policy experts worry about a social system which faces an increasingly technological world, universities work to show students the role of the basic chemical and biochemical sciences as they function within the context of complex medical systems. Chemistry and biochemistry are central to the world around us and it is not that difficult to understand them or their importance to our social and economic systems.

**Course Objectives:** The overall objectives of this course are to provide each of you with an understanding of some chemical principles, an appreciation of how chemistry pervades our society, the historical aspects of its concept development, an ability to understand some of the scientific issues which confront us as citizens, and an appreciation of how, and the extent of which, science is able to solve our problems (or create them).

The specific goals are: 1). to become familiar with the methods of science used by chemists and biochemists; 2). the role of experimentation and hypothesis testing; 3). major concepts of chemistry such as conservation of matter, periodic table, bonding and reactions; 4). the role of chemistry in society and medicine as evidenced by readings or magazine reports.

#### Learning Objectives:

1. What is the difference between matter and energy?
2. What feature of the atom determines its identity?
3. What are the fundamental types of chemical bonds, and how are they formed?
4. What is a chemical reaction? How does one balance a reaction? What is the definition of a mole? And how does it allow for the determination of mass-mass relationships in chemical reactions?
5. What are states (phases) of matter and how do intermolecular forces affect the phase at a given temperature?
6. What is a solution, and what general feature of the solvent determines the types of solutes that will dissolve?
7. What is the activation energy for a reaction, and how does this energy influence the rate of a reaction?
8. What is the difference between acid and base?

**Grading Scheme:** Your grade will be computed on the following numerical basis:

3 Exams	300	
Final	100	Comprehensive
<u>Lab</u>	<u>100*</u>	
Total	500*	

The grades will not be curved but I reserve the ability to adjust grades upward. Individual effort will be noted. Letter grades will be assigned with the following approximate cutoffs: A = 450; B = 400; C = 300; D = 200. Plus and minus grades will be used.

**Exams:** The hour exams will cover material from textbook chapters as well as associated concepts from the laboratory. The Final will cover the whole course, but the major component of the exam will focus be on the material covered since the third exam.

**Examination Make-ups:** Exams cannot be made up unless you arrange a time before the exam and you have a valid excuse. In the event of an unforeseen emergency, contact me as soon as possible. You may be asked to document your excuse. KEY WORDS: TALK TO ME. In general, no work will be accepted after the Final Exam.

**Lab:** Each experiment will require a report. You will be graded on the quality of your personal results (where appropriate), your report, and your level of participation in group activities. Your teaching assistant will be responsible for assigning lab grades, and he/she will explain how your point total for lab will be determined. Some lab activities may be 1) review for exams, 2) videos of issues in modern chemistry, 3) safety instruction, and 4) assessment exercises. You must attend **EVERY** lab.

**Lab Section:** See your lab book for rules applicable only to your section and the lab schedule. If you are going to miss a lab see the TA beforehand. If you ignore the TA or safety rules, you will be dismissed from the lab and the course.

**Homework:** Doing the homework problems is the key to success. I will suggest problems from the "Exercises" section at the end of each chapter and the solutions to these questions are in the back of your book. **None of this work is to be turned in;** but if you have questions we should discuss them in class. Working with these exercises is part of what you must do to prepare for exams.

**Lecture Text:** Introduction to General, Organic and biochemistry by Bettelheim, et al. (11<sup>th</sup> edition)

This classic text is organized by sections and based on current issues related to biomedicine. The first part is the structure of matter and some chemical concepts. Other chapters are related to organic chemistry and biochemistry.

**Department Policy on Cheating:** The Chemistry & Biochemistry Department Policy on Cheating is: “Any student caught cheating will be assigned a course grade of F. The student’s academic advisor will be notified of this failing grade and the student will not be allowed to drop the course.” The department considers performing unauthorized “dry labs” as cheating. Partnering during the lab is acceptable but lab reports must show your own calculations and ideas.

**UAF Attendance Policy:**

You are expected to attend classes regularly; unexcused absences may result in a failing grade. You are responsible for conferring with your instructor concerning absences and the possibility of arranging to make up missed work.

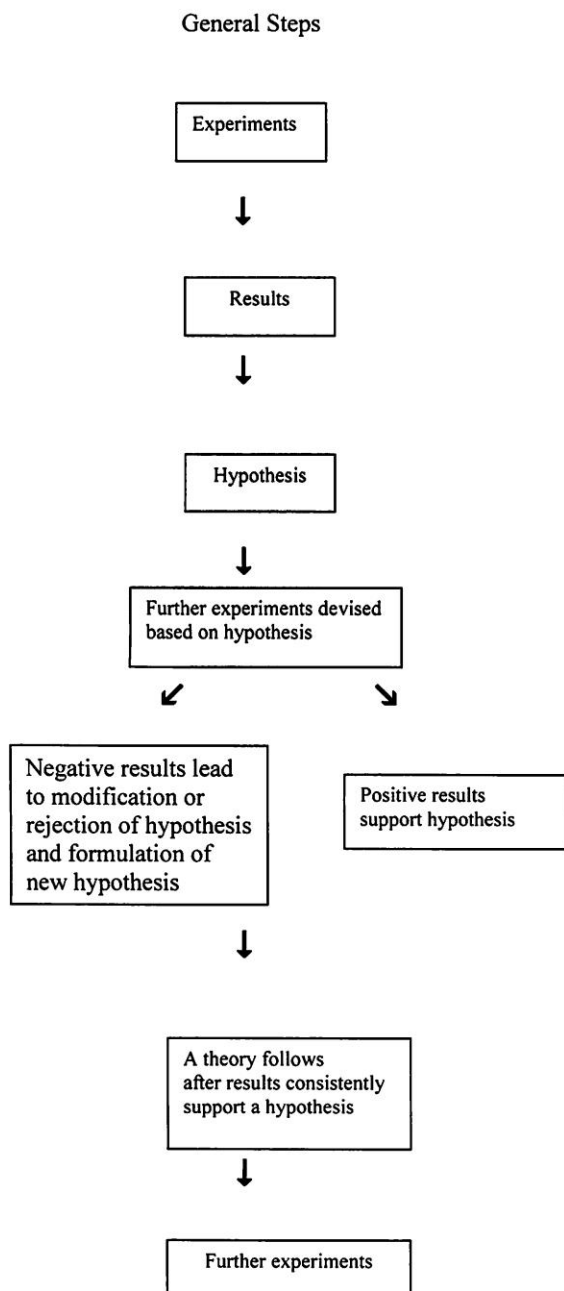
If you are required to participate in either (a) military or (b) UAF-sponsored activities that will cause you to miss class, you must notify your instructor as soon as possible of your absence. You must notify your instructor(s) of all scheduled UAF-required absences for the semester (e.g., travel to athletic events) during the first week of classes.

You and your instructor will make a good faith effort to make suitable arrangements to assure that you can make up classes and work you miss and are not penalized for your excused absence. If suitable arrangements cannot be made, you will be allowed to withdraw from the course without penalty. However, your instructor is under no obligation to allow you to make up missed work for unexcused absences or if notification and arrangements are not made in advance of the absence.

**Disabilities:** Students with a physical or learning disability are required to identify themselves to Mary Matthews in the Disability Services office, located in the Center for Health and Counseling in order to receive special accommodations. The student must provide documentation of the disability. Disability Services will then notify me of special arrangements for taking tests, working homework assignments, and doing lab work.

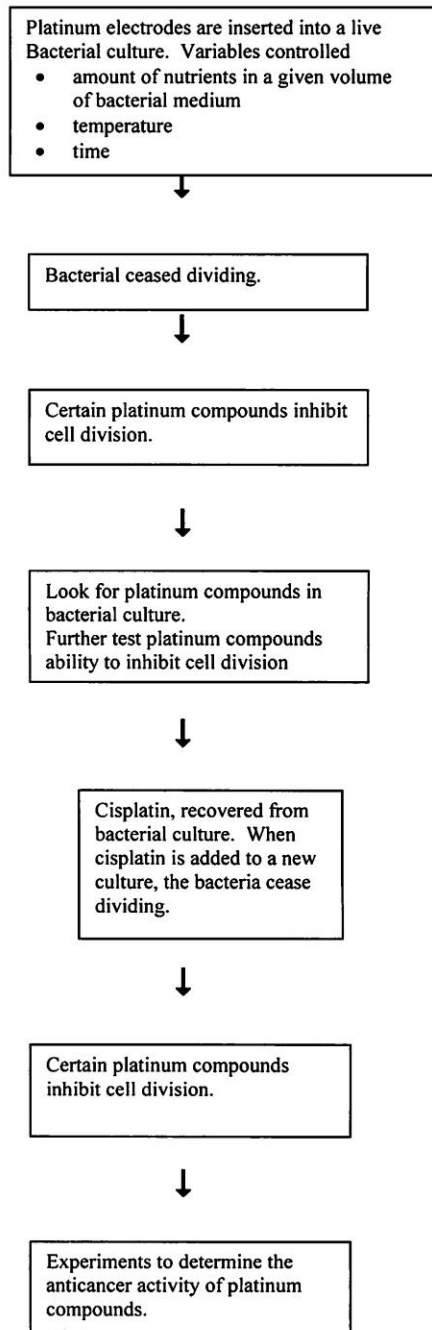
## SCIENTIFIC METHOD

A representation of the scientific method



An Example:

Rosenberg's Work



Week	Lecture	Title	Chapter
August - September	1	Introduction/Sustainability	
September	2	Scientific Method	1
	3	Matter	1
September	4	Measurements and Unit Conversions	2
	5	Structure of the Atom/Matter	3
September	6	Periodic Table	3
	7	<b>EXAM 1</b>	
September - October	8	Octet Rule and Chemical Bonds	4
	9	Ionic and Covalent Compounds	4
October	10	Naming of Simple Covalent Compounds	5
	11	Shapes and Properties	5
October	12	Chemical Reactions	6
	13	Balancing Chemical Reactions	6
October	14	Mass Relationships	6
	15	Oxidation Reduction/Heat of Reaction <b>EXAM 2</b>	9
October -November	15	Gas Laws	7
	16	Attractive Forces	7
November	17	Solution types	8
	18	Water as a Solvent/Solubility	8
November	19	Colligative Properties	8
November	20	Reaction Rates	9
	21	Le Châtelier's principle	9
November	22	Acid and Bases	10
	23	<b>EXAM 3 take home (Thanksgiving break)</b>	
December	24	PH Scales	10
	25	Buffers	10
December	26	Radioactivity and Half- life Fission and Fusion	11 11
December	27	<b>FINAL EXAM</b>	