

Chem 100X

Chemistry in Complex Systems

Fall 2009

Lecture: M, W, F 11:45 - 12:45 PM NSF 201B
Lab: W 2:15/W 6:30 pm, NSF 245
Recitation: Tutoring hours 3:15 – 4:15 pm
Instructors: Lawrence K. Duffy, 362 NSF x7525
Lecture Text: Chemistry in Context (Current Edition)
Lab Text: Lab Manual (selected from Chemistry in Context Labs)
Office Hours: F: 4-5 PM (x7525)
Email: fflkd@uaf.edu

Philosophy: At the same time political 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 natural 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. There are no prerequisites for this course, except those required for a core course.

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

The specific goals are: 1) to become familiar with the methods and ethics of science used by chemists and biochemists; 2) the role of uncertainty, hypothesis testing, and weight of evidence in environmental issues; 3) major concepts of chemistry such as conservation of matter, chemical reactions, pH, pollution effects, etc. 4) an appreciation of the science in traditional knowledge systems

Class Conduct: The attached class schedule is my best estimate of how we will cover some of the material in the text. Students are encouraged to attend class and to contribute to discussion on the content and issues discussed in the text. However, my intent is to thoroughly cover whatever we attempt rather than to “stay up with the syllabus no matter what.” At any rate, during lecture periods I will try to help you understand the material and discuss some of the things about which you have read. The laboratory part of the course consists of an activity each week which is, in some way, related to lecture material. I expect you to regularly attend lecture and require that you regularly attend lab. My assumption will be that you have done the assigned reading (sections of chapters) and preparation before you come to lecture or lab. UAF Conduct and Safety Policies including Code of Conduct in the class schedule for 2009 and the UAF catalog. Cheating is not tolerated, and a grade of F can be assigned.

NOTE: Attendance will be taken in the form of a quiz or problem

Lecture Text: This year we are using a nationally designed text. The text is organized several sections based on current social and political issues. The first part is the structure of matter and some chemical concepts. Other chapters are related to water, energy and nutrition.

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

| | | |
|--------------|-------------|--|
| Quizzes (10) | 200 | |
| 3 Exams | 300 | |
| Final | 100 | Comprehensive with emphasis on recent material |
| Book Report | (50) | Optional |
| Lab | <u>200*</u> | |
| Total | 800* | |

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 = 720; B+ = 680; B = 620; C+ = 580; C = 500; D = 400.

* Education majors or service learning grades will be modified as described in lab section. Half of the lab grade will be based on the students' self assessment. Policy essay will count as a lab grade.

FRESHMAN GRADES – will be based upon quizzes and any exam that is taken before the reporting date.

Quizzes: There will be a 10-15 minute quiz during the class (10 pts) covering the previous week's material. Your best 10 scores will count toward your grade. No make-up quizzes will be given.

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 will be on the last several weeks of the course.

Book Report: (Extra Credit and Optional) Each student can turn in a book report. Both literary and scientific content will be evaluated. The book report should be 600-800 words describing the book and its relation to the course. The book report will be on an appropriate book, such as 1) Native Science, 2) .When Smoke Ran Like Water, 3) Firecracker Boys, etc. If you exercise this option, the book report is due the last week of class. The book report should be no longer than 3 pages.

Lab: Each experiment will require a report (generally to be turned in before you leave lab). 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) watching of the play "Oxygen", 4) safety instruction, and 5) 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 quizzes and exams. Some of the quiz material will come from the end of chapter exercises.

Extra Quiz Credit: Occasional seminar speakers will be on campus to address the topics we are covering. Attendance at the seminar will be equal to 20 points (one quiz). Like the book report, seminar attendance is optional.

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.

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.

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.

Outcomes of Learning Assessment:

Context and action relating Science Literacy to Policy or real issues*

- Scientific method and use
- Experimental design
- Science impacting society and policy

Outcomes will be measured

- SALG/Self Assessment during lab

*See science core assessment for details

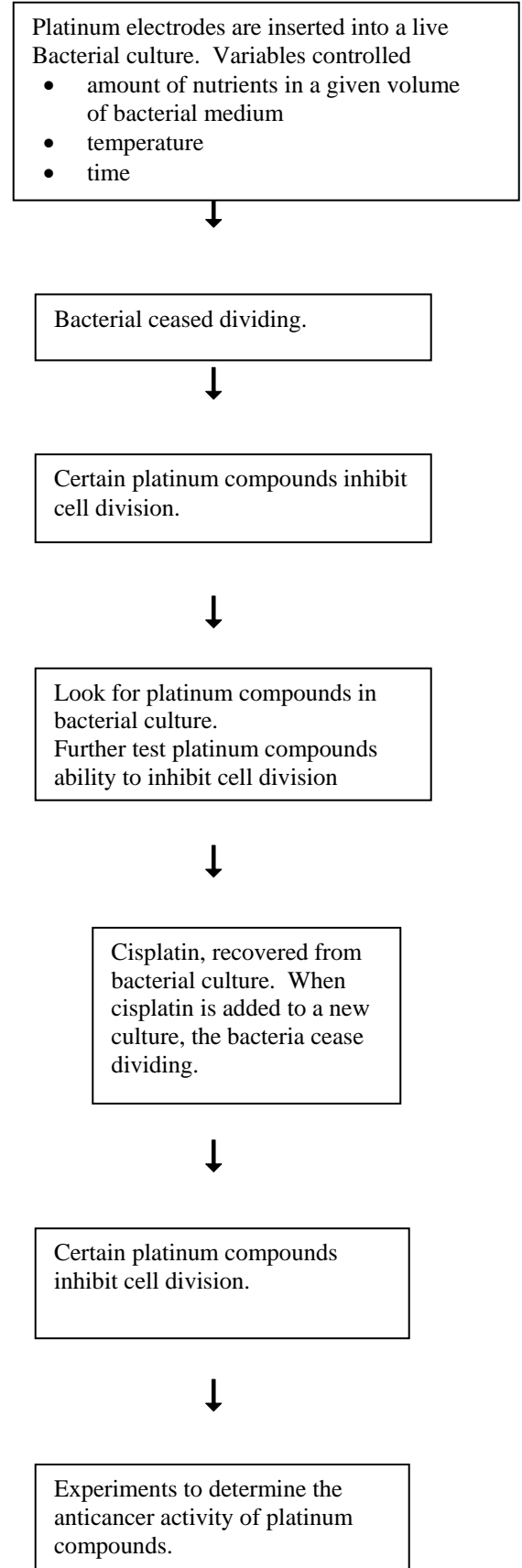
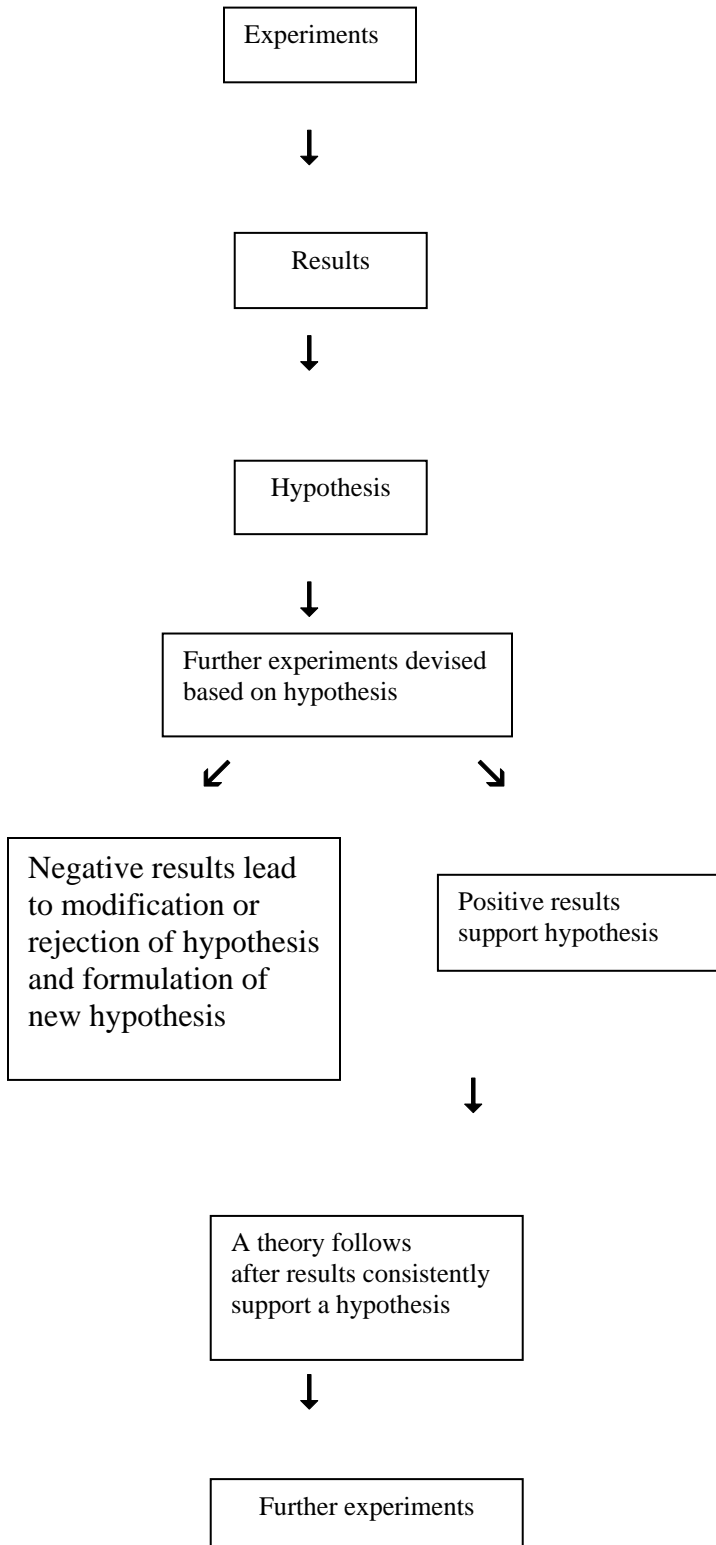
SCIENTIFIC METHOD

A representation of the scientific method

An Example:

Rosenberg's Work

General Steps



Chem 100 Lecture Plan
RAHI Summer 2009

| Week | Title | Chapter | Historical | Societal | Culture |
|----------------------------|--|----------------|------------------------|-----------------------------|-------------------------------|
| Week 0 | Scientific Method, Research Ethics | 0 | Cisplatin Vitamin C | Technology | Alaska Native Knowledge |
| Week 1 | Classifying Matter Elements/Mixtures | 1 | Lavoiser | Air pollution | Impacts: Subsistence |
| Week 2 | Periodic Table Naming Combustion/ Reactions | 1 | Burning | Air Pollution Policy | Impacts: Forrest Fires |
| Exam 1 Chapter 1 | | | | | |
| Week 3 | Molecular Structure Lewis Dot Chapman Cycle | 2 | Chapman | Ozone | Sunburn |
| Week 4/5 | Molecular shape Carbon cycle Trophic levels | 3 | CFC/POPS | Carbon Dioxide Policy | Arctic Council |
| Week 5/7 | Greenhouse Gases | 3 | IPY | | Global Transport |
| Exam 2 Chapters 2 and 3 | | | | | |
| Week 8 | Energy Mass/moles Bonds Petroleum/Nuclear | 4/7 | Fossil Fuels | Climate Energy Era | Ecosystems |
| Week 9 | Water Concentration Properties | 5 | Linus Pauling | Water Quality | Ice |
| Week 10 | PH Acid Rain | 6 | Coal | EPA | Seven Generations |
| Exam 3 | | | | | |
| Week 11 | Carbon Functional Group Aspirin | 10 | Drug Discoveries | Biotech Health Care | Natural Products Willow |
| Week 12 | Steroids | 10 | Lipids | Human Enhancement | Diabetes |
| Week 13 | Nutrition Lipids | 11 | Proteins | | Food Preservation |
| | Carbohydrates Proteins Vitamins | 11 | | Food Pyramids | Caribou Gut |
| Week 14 | Genetic Engineering | 12 | Watson Dolly | Profiling Cloning | Origins Identity |
| Final Exam | Wednesday, December 16, 10:15 am | | | | |

Note: Exams will be take home. Quizzes will be in class.

LAB SCHEDULE

| | |
|--------|--|
| Lab 0 | SALG/Scientific Method |
| Lab 1 | Safety Lab Recognizing Chemical Hazards |
| Lab 2 | Is it pure or a mixture, p. 19 |
| Lab 3 | Can I spot a trend?, p. 23 |
| Lab 4 | Science and Society Essay |
| Lab 5 | What does a molecule look like? page 33 |
| Lab 6 | What protects us from UV?, page 39 |
| Lab 7 | Solubility- design an experiment, page 43 |
| Lab 8 | Chemical moles, p.45 |
| Lab 9 | Does acid reign? P. 51 |
| Lab 10 | Which common materials are acids or bases? P. 59 |
| Lab 11 | SALG and IAS |

Lab Essay: discuss the impact science (i.e. chemistry and biology) studies or science education will have on the social, economic or political future of rural Alaskans. Discuss in terms of resilience, mitigation and adaptation.

You must attend **EVERY** lab.