

Role of Chemistry in History

Classroom - M W F 10:30-11:20 – Stuart Hall, Room 1104 (Stafford Auditorium)

Laboratory - **Prof. Samet is the laboratory professor and will provide all necessary information in a separate laboratory syllabus.**

section 01 (111-01) meets Monday 12:30-2:30

section 02 (111-02) meets Monday 3:00-5:00

(note: pre-lab sessions meet in Stuart 1113, experiments performed in 1121)

Name: **Prof. Cindy Samet**

Office: **Stuart Hall, Room 1107**

(office hours: see Blackboard site, and by appointment.)

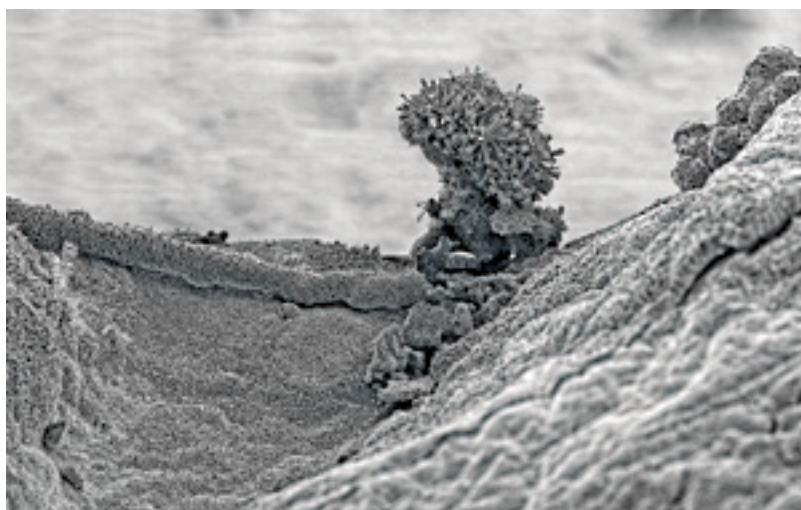
Phone: **1295**

Email: **samet@dickinson.edu**

Web: **www.dickinson.edu/~samet**

*A Blackboard (Bb) site has been created for this course. Students will self enroll.

“Most of us never give a thought to the history or nature of spices or rubber or nicotine or penicillin or a score of other things – chemicals – that have changed the world...” -Oliver Sacks



NANOSCAPES: Zinc Oxide Glen Inside a tube furnace at 500–600 °C, shrub-like forms take shape on a grass of zinc oxide that has grown atop a zinc foil. (C&EN Vol. 86, No. 47, November 4, 2008)

General Chemistry (CHEM 111)

Prof. Samet/ Spring 2009

About the course: Chemistry 111, General Chemistry, is designed for non-science majors. Although there is no Dickinson College prerequisite for this course, I assume everyone has taken high school chemistry and therefore has some basic knowledge of atoms and molecules. In this course, we will focus on **chemistry in history** rather than the history *of* chemistry.

The focal point of the course is a wonderful book titled “Napoleon’s Buttons: How 17 Molecules Changed History.” It will be our goal as a class to compose our own book, with each student contributing a “chapter” about a specific molecule that has somehow changed history. Many more details will follow! Be sure to see the article about this course published by Professor Samet in the *Journal of Chemical Education* (see link on Bb site!).

“The idea that momentous events may depend on something as small as a molecule – a group of two or more atoms held together in a definite arrangement – offers a novel approach to understanding the growth of human civilization. A change as small as the position of a bond – the link between atoms in a molecule – can lead to enormous differences in properties of a substance and in turn can influence the course of history.”

-from “Napoleon’s Buttons”

Required Course Materials:

(all are available in the College Bookstore)

Book: Napoleon’s Buttons: How 17 Molecules Changed History

Authors: Penny Le Couteur and Jay Burreson

Publisher: Penguin Putnam Inc., New York, 2003

Text: The Chemistry of Everything

Authors: Kimberly Waldron

Publisher: Pearson Prentice Hall, 2007.

Clicker (H-ITT transmitter, class response system) – see note below

Laboratory Supplies: Goggles or Laboratory Safety Glasses (Z87), Laboratory notebook - any bound composition book (black-and-white marble cover, no removable pages) will suffice.

Laboratory Experiments: will be available on Blackboard, and must be downloaded by the student *prior to coming to lab each week*.

***Note:** You will be renting a “clicker” or H-ITT transmitter from the chemistry department. You will pay \$20 up front and will get \$10 back when you return your clicker at the end of the semester. **YOU MUST BRING YOUR CLICKER TO CLASS EVERY DAY!**

Course Grade: There will be a total of 1000 points possible in the course:

Exams	- 40% (2 exams at 200 points each)
Laboratory component	- 25% (250 points)
Napoleon’s Buttons project	- 20% (200 points, paper-150/web feature-50)
Clicker Quizzes/Attendance	- 15% (150 points)
Extra Credit-Movie Moments	- 2% (20 extra credit points/group grade)

Attendance: Classroom/lecture material is emphasized on the semester exams and therefore class attendance is crucial, especially since much of the material I cover in class is not covered the same way in a general textbook. I consider class discussion to be important. Note well that attendance is incorporated into your final grade. Although I am not specifying a detailed attendance policy for the classroom component of this course, missing class excessively will surely affect your grade. I consider more than 3 class absences (i.e. missing one full week of the semester) to be approaching the limit at which I would lower the student’s course grade. Students are responsible for any missed class work (handouts, notes, homework assignments). Making up a missed exam is at my discretion and depends upon the circumstance. Certain situations may require written

documentation. If you know you will be absent for a serious reason beforehand, please see me to arrange to take the exam early if possible. Since this is a laboratory science course, **attendance in the lab each week is essential**. *Missing one laboratory session will affect your final course grade in a significant way.* **More than one missed laboratory session will result in a failing grade for the course**, since the course does satisfy a lab science requirement.

Napoleon's Buttons Project: As a class, we will be writing *our own* book – our own Napoleon's Buttons, so to speak. Each student will write a chapter for our book. This chapter (i.e. paper) will be due at the scheduled time for the final exam, which is Thursday, May 7 at 10:00 a.m. (there will be no final exam in the course). We will have a class contest to name our book, and a prize will be given – MORE DETAILS TO FOLLOW! I am very enthusiastic about this project and am sure it will make for an exciting semester.

There will be a due-date (see course calendar) for having your *unique* topic (first come, first served) approved by me before you start your research and writing. Be sure to use proper grammar and the APA reference format throughout the text of your paper and attach a literature cited page as a separate page at the end of your paper. We will be talking in detail about the project and you will be given a **separate project handout** with more details later in the semester. The project will involve writing a chapter for our book as well as designing and presenting a “web feature” to the class. We may also create a public exhibit of some of our molecules here at Dickinson!

The work on this project/paper must be your own – that is, you are to work on this paper by yourself. Of course, you may consult with me, or library staff at any time or go to the

writing center. Be sure to consult Dickinson College's Student Code of Conduct for details about the college's definition of plagiarism.

Miscellaneous Course Notes

1. Just because this is a "100-level" course does not mean it is *easy*, "a gut" course, or "baby chemistry." On the contrary, it is a creative course that will expose you to chemistry and what chemists do. Most important, it will challenge you, as any Dickinson College course should. Many students have the wrong idea about 100-level courses. The course number implies that the course has no Dickinson College prerequisite and that it is introductory in nature, that is, an introduction to a specific discipline. The number implies nothing about the "ease" of the course.

2. This course will involve both a classroom and a laboratory component. Both reinforce each other, and require your time and attention. Although this course will involve skills that you already know (careful reading, writing, oral presentation of material), it will also teach new skills (laboratory techniques, web design) and will require *practice* on a daily basis to master the chemistry concepts. I consider three hours of outside work for every in-class hour to be the minimum of what is needed to succeed in this course.

3. Note well – the class librarian is Amelia Brunskill. Her contact information is posted on the Bb site for this course.

COURSE SCHEDULE (Classroom component only - subject to change to meet course objectives.

Laboratory information will be provided separately).

*Detailed information about daily assignments, etc. is found on Bb!

1/19 intro/syllabus, Bb, etc. KW xv, xvii-xxi	1/21 What is Chemistry? NB Introduction/KW1	1/23 atoms and light KW 5 (5.1, 5.2, 5.3, 5.7, 5.8)
1/26 orbitals/e- config/Pd. Table KW 2 (2.1, 2.2, 2.7), 5	1/28 Building Molecules Lewis structures, shapes KW 3.6 (handouts)	1/30 Lewis structures, shapes KW 3.6-3.8
2/2 Consequences of shape The Greenhouse Effect KW 8 (intro + 8.7)	2/4 polarity intermolecular forces, etc. KW 7	2/6 hydrogen bonding KW 7 NB3: Glucose/taste
2/9 CARBON (allotropes) diamond sp^3 -hybrid'n (Td carbon) KW 3 (3.1, 3.2)	2/11 graphite and sp^2 -hybrid'n benzene rings KW 3.3	2/13 Buckyball (video clip) Nanotech/Nanotubes KW 3.4, 3.5
2/16 librarian visit Discuss project	2/18 review for Exam #1	2/20 EXAM #1
2/23 CARBON COMPOUNDS alkanes (and isomers) fuels explosives etc. NB 4,5,16 (and p.9)/ KW 9	2/25 alkenes – linear cis/trans isomers Lipids and Fatty Acids NB14/KW 12 (12.1, 12.2)	2/27 Polymers (man-made) NB 4,6,8 /KW 10
3/2 Polymers, ctd NB 4,6,8 KW 9	3/4 Polymers – natural Amino acids KW 11	3/6 Polymers - natural Proteins KW 11

SPRING BREAK – NO CLASS 3/9, 3/11, or 3/13

3/16 natural polymers-DNA structure KW 11	3/18 DNA KW 11	3/20 *NB project topic and outline DUE! cancer treatments/cisplatin KW 11/web
3/23 proteins/hemoglobin sickle cell anemia/malaria NB 17/KW 11.3	3/25 Drugs I – proteins as receptors (movie clip – What the Bleep NB 10,11/KW 13.1, 13.4	3/27 Drugs I KW 13
3/30 Drugs II (narcotics,etc.) NB 12,13/KW 14	4/1 Drugs II	4/3 open/catch up web activity
4/6 catch up, wrap up etc.	4/8 review for Exam #2	4/10 EXAM #2
4/13 Marvelous Movie Moments	4/15 Marvelous Movie Moments	4/17 Finish MMM
4/20 NB presentations (6 min ea.) 1-8	4/22 NB presentations 9-16	4/24 NB presentations 17-24 *DRAFT DUE
4/27 NB presentations 25-32	4/29 NB presentations 33-40	5/1 NB presentations 41-48

*course evaluations will be done in lab on Monday 4/27

Notes:

- 1) Detailed reading assignments can be found on the Blackboard Site for this course.
- 2) Your NB Chapter topic and *detailed* outline are due Friday 3/20.
- 3) A near-final DRAFT of your chapter is due Friday 4/24.
- 4) Your final NB Chapter is due at the time slot that our final exam for this course would be given – on **Thursday, May 7 at 10:00 a.m.. Note well, the actual final exam time slot is 9-12, but you should hand in your paper at 10:00 am. I will collect all papers in Room 1104. Late papers will not be accepted.** If you cannot get your paper to me by 10:00 a.m., then be sure to hand it in the day before!