

# Evolution of Miramar College's Online Allied Health Chemistry Course

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ACS National Meeting @ SF, Sept 14, 2006

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Miramar COLLEGE  
SAN DIEGO COMMUNITY COLLEGE DISTRICT

# Outline

- SDCCD and Miramar College
- History and Conception
- Student Learning Outcomes
- Chem 100 Lecture
- Chem 100 Lab
- Online vs. Traditional

# Abstract

The on-line allied health chemistry courses, chemistry 100 has been offered at San Diego Miramar College since fall 2001 (5-years), and the lab has been offered since spring 2003 (3.5 years). Both uses a WebCT platform, but there is also a mirror website also outside of WebCT . This presentation will cover the conception and evolution of these courses and how these courses are assess. Assignment for the lecture is based on quizzes, homework, special project, discussion-board participation, midterm and a final. The assessment for the lab are based on problem set exercises, experiments conduct at home, lab notebook entry, a safety quiz, a midterm quiz and a final quiz. Studies will also be presented on how the online course compares to the traditional on-campus course.

# Miramar College

- **San Diego Community College District:** Second largest in California and 6th largest in the nation serving over 100,000 students. Miramar College is one of three campuses. The other sister colleges are San Diego City College and Mesa College. Students generally transfer to UCSD, SDSU, Cal San Marcos. Students pay \$3/unit in the California community college system.
- **Miramar College:** There is a general population of 14,000 students of which 1763 are enrolled in chemistry. MMC offers variety of vocational program and AS degrees. Demographics: 49-F 51-M, 44%-Caucasian 14.1%-Asian-Pacific, 12.5%-Hispanic 11.4%-Filipino 6%-African-American. Age group 25-49 median age 32. Educational objective: further education (transfer) 43%, undecided 37%, vocational 21%.
- **Natural Science:** Prop-S 655 Million expand our department from 2 labs to eight with expansion to 6 more labs in 2-3 yrs. Strong biotech program and instrumentation holdings; NMR, AA, LCMS, Fluorolog-3, FTIR, Vernier, Cary-50...
- **Chemistry Program:** Faculty of 2 chemist to 5.5 in 2 yrs. Dept that had only offered allied health chem, prep and GChem now has full organic and analytical chem program which means students can earn an AS in chemistry.



# Student Learning Outcomes

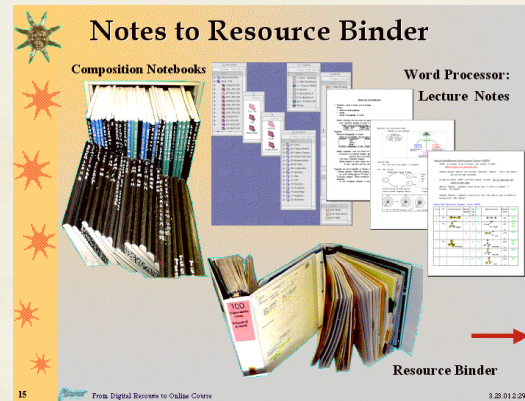
- Understand how Scientific Method is used in science
- Understand and explain the properties of matter and its transformation
- Apply SI, English and metric units when making measurements
- Understand key concept in the development of atomic theory
- Understand and explain the role of valence electrons in periodic trends, bonding, molecular geometry and molecular properties
- Understand and explain important features of the periodic table
- Name and write chemical names and chemical formulas
- Identify and classify different type of chemical reactions
- Understand the role of the "mole" in stoichiometry calculations
- Understand and explain Gas laws in terms of gas behavior
- Understand the concepts of solution chemistry including concentration calculations and dilution problems
- Understand the properties of acid-base concept and pH calculations
- Understand and explain the principle behind equilibrium and LeChatelier's Principle
- Understand the concept of nuclear reactions and nuclear processes
- Understand work on organic nomenclature and recognition of functional groups.

# History and Conception ...

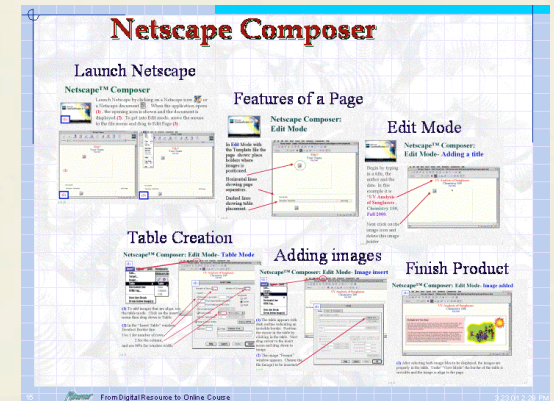
- Lecture Notes to Digital Resource to Online Course



Pacific Basin 12/00  
"Resource Binder to  
WWW Resource"



155th 2YC<sup>3</sup> 03/01  
"Digital Resource to  
Online Course"



221 ACS Meeting  
03/01 "Converting  
Documents to Web  
Pages"

# Chem100 Lecture F06

<http://webct.sdccd.net/>

Homepage  
Announcement  
Syllabus Schedule  
Calendar  
Course Assignment  
Lecture Notes  
Sample Quizzes  
Self-Quizzes  
Hands Out  
Student Tools  
Communication  
Resource  
Grade Book  
ChemReview Tutorial  
Plugins  
ChemInfo & Eqn  
Quick Link

Back Forward Stop Refresh Home AutoFill Print Mail  
Address: http://webct.sdccd.net/SCRIPT/chem100\_testfy/scripts/serve\_home  
myWebCT Resume Course Course Map Check Browser Log Out Help  
CHEM 100 - 30210 - Fundamentals of Chemistry F. Garces

Course Menu  
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ChemReview Tutorial  
Plugins  
Chem Info & Equations  
Jan 27 - Quiz 3  
Jan 13 - Quiz 2  
Jan 06 - Quiz 1  
Feedback Survey

Homepage  
Sept 11, 2006  
Chem 100 Online, CRN 30210  
Sample Course  
FG  
Chem100  
Announcement  
CRN 30210  
Syllabus Schedule Policies  
Calendar  
Content Assignments  
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- ChemReview
- Tutorial
- Plugins
- ChemInfo & Eqn
- Quick Link

## Calendar

WebCT

September 2006    Previous month    Next month

Date: September 4, 2006    Go    Add entry    Complete entries

To view, add to, or edit the daily schedule, click a hyperlinked date below.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	
View Week					1	2	
View Week	3	4	5 -Begin Chp 1	6	7	8 -Mandatory Orientation at Miramar College Room S5-209 at 10:00am	
View Week	10	11 -Begin Chp 2	12	13 - Today -Due: Chem PreTest -Due: Background Survey More...	14	15	16 -Due: DHMO assignment
View Week	17	18 -Begin Chp 3 -Due: HmWk Chp 2	19	20	21	22 -Quiz 1 (Chp 1, 2 & 3)	23 -Due: HmWk Chp 3
View Week	24	25 -Begin Chp 4	26	27	28	29	30 -Due: HmWk Chp 4

Note: All private entries are italicized.

## Lecture Notes

Course Menu

Homepage > **Lecture Notes**

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Lecture Notes	Lec Discussion
Lec Discussion	
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Communication	
Student Tools	Chapter 02.
Grade Book	
Resources	Chapter 03.
ChemReview Tutorial	
Plugins	Chapter 04.
Chem Info & Equations	Chapter 05.
H Quiz	Chapter 06.
H Dec10_Practice Final	
H Dec09_ Quiz 4	Chapter 07.
H Nov17_ Quiz 3	
H Oct23_Midterm Exam	Chapter 08.
H Oct13_ Quiz 2	
Sep22_ Quiz 1	Chapter 09.
Sep 16_ HW: DHMO	
Sep 13_ HW: Chp1	
Sep13_ Chem PreTest	
Sep13_ What U Know: S	
Sep13_ Background Sur	
H - Hidden	

## Chp1 Lecture Notes

Course Menu

Homepage > Lecture Notes > Chapter 01. > **Chapter 01: Introduction to Chemistry**

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Lec Discussion		
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H Dec10_Practice Final		
H Dec09_ Quiz 4		
H Nov17_ Quiz 3		
H Oct23_Midterm Exam		
H Oct13_ Quiz 2		
Sep22_ Quiz 1		
Sep 16_ HW: DHMO		
Sep 15_ HW: Chp1		
Sep13_ Chem PreTest		
Sep13_ What U Know: S		
Sep13_ Background Sur		
H - Hidden		
Summary		
Activities		
Tutorial		
Video		
Intro to Matter		<a href="#">Back to Course</a>
		<a href="#">Content</a>



# Chem100 Lab F06

<http://webct.sdccd.net/>

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Lab Policies & Safety

Introduction, Appdx

Activities & Exercise

Experiments

Communication

Resources

Grade Book

Quick Link

Address: [http://webct.sdccd.net/SCRIPT/chem100fg/scripts/serve\\_home](http://webct.sdccd.net/SCRIPT/chem100fg/scripts/serve_home) go

myWebCT Resume Course Course Map Check Browser Log Out Help

**CHEM 100L - 30215 - Fundamentals of Chemistry Lab - F. Garces**

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- Resources
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- Feedback Survey
- MidQuiz Study Guide

**Homepage**

**Miramar College**  
**Chemistry Department**

**Chem 100 Lab CRN 30215**  
**February 06, 2006**

Your final grade has been emailed to all of you. Very successful for most of you. If you have questions please email me. Have a good spring term and best of luck to all of you in your future.

-FG

Chem100 Lab    Announcement    CRN 30215

Syllabus Schedule    Calendar Assignments    Lab Policies & Safety

Introduction Appendix    Activities Exercises    Experiments

Communication    Student Tools    Resource

# Chem100 Lab F06

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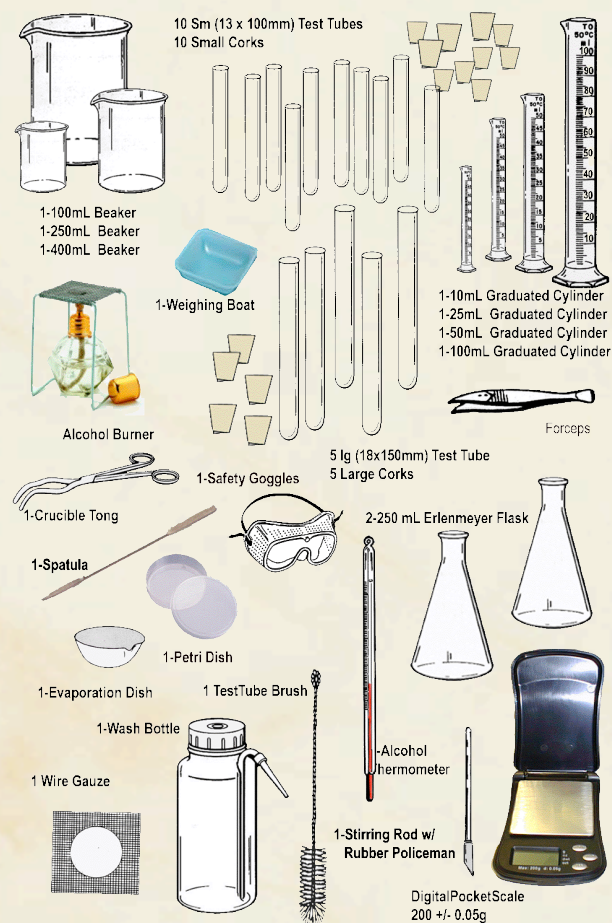
Quick Link

## Lab Equipment Kit

KLM Supply List Fall 06

#	Qty	Description
1	1	Alcohol Lamp (Burner)
2	2	Beaker (100ml)
3	1	Beaker (250ml)
4	2	Beaker (400ml)
5	1	Crucible Tong
6	1	Cylinder (10ml)
7	1	Cylinder 25ml)
8	1	Cylinder (50ml)
9	1	Cylinder (100ml)
10	1	Evaporating dish
11	2	Flask Erlenmeyer (250ml)
12	1	Forceps (Tweezers)
13	1	Petri dish
14	5	Pipets (plastic droppers)
15	1	Safety Goggles
16	1	Scale & weights (200+ .05g)
17	1	Spatula
18	1	Stirring rod with Policeman
19	10	Test tube (13x100)
20	5	Test tube (20x150)
21	10	Test tube stopper (13x100)
22	5	Test tube stopper (20x150)
23	1	Test tube brush
24	1	Thermometer, Alcohol
25	1	Wash bottle (250 mL)
26	1	Weigh boat (2")
27	1	Wire gauze

### illustration



# Chem100 Lab F06

## Lab Supply list

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Quick Link

Material, Chemicals and Equipment      Online Chem 100 Laboratory      Fall 06

Scroll to end of document to see illustration of equipment and Supplies

Experiment #1: A Penny for Your Thought: Scientific Method Introduction

Equipment (Total Time 60 - 90 min.)

Lab Kit Contains:      Digital Pocket Scale      Forceps      50-ml graduated cylinder

Lab supply      1 M HCl  
You supply:      metric ruler      Pennies      Shear metal cutter or file

Experiment #02: Measurements, Metric System and Density of Irregular Object

Equipment and Chemicals (Total Time 90 - 120 min.)

Lab Kit Contains:      Alcohol Thermometer      100mL beaker      250 mL beakers  
25 mL grad cylinder      50 mL graduated cylinder      Cork (for 20 x 150 mm)

Lab supply      Marble  
You supply:      String      Empty 2-L Soda bottle with cap      Metric ruler  
Zumdahl Textbook

Experiment #3: Separation of a Ternary Mixture

Equipment and Chemicals (Total Time 60 - 90 min.)

Lab Kit Contains:      250mL glass beaker      400mL glass beaker      Forceps  
Evaporating dish      Scoopula      Alcohol burner

Lab supply      Cobalt(II) chloride      Iodine crystals      sand  
You supply:      Burner from stove      Distilled water      Ice cube

Experiment #4: Observing Signs of a Chemical Reaction

Equipment and Chemicals (Total Time 90 - 120 min.)

Lab Kit Contains:      Test tube (13 x 100) small      Test tube cork (13 x 100)      Berel Pipet  
Evaporating dish      Forceps      scoopula  
Alcohol burner & stand      400ml Beaker      Beaker 100mL

Lab supply      calcium oxide (lime water)      ethanol      magnesium metal strip  
copper shots      Straw

You supply:      acetic acid (vinegar)      sucrose (table sugar)      sodium chloride (table salt)  
sodium bicarbonate (baking soda)      9-V Battery      spoon  
oven-mits

Experiment #5: Studying Chemical reactions (See Experiment #5)

Experiment 06: Counting by Weighing via the Mole

Equipment and Chemicals (Total Time 60 - 90 min.)

Lab Kit Contains:      Digital Pocket Scale      50-ml graduated cylinder      Forceps

Lab supply      HexNuts      Bolt      Bean Rice in a Bag  
Bolt-HexNut      Bolt-(HexNut)2      Bolt-(HexNut)3  
Bolt-(HexNut)4      Marble      Packet of sugar

WebCT information      BagA (HexNut Unknown)      BagB (BN Unknown)      BagC (Bean-Rice Unknown)  
BagD (BN<sub>n</sub> Unknown)      BagE (BN<sub>n</sub> Unknown)





# Chem100 Lab F06

## ... Lab Policies and Safety

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## Safety Quiz

WebCT Quiz

**Safety Quiz Fall06**

Name: Chem Student  
Start time: September 13, 2006 3:59pm  
Time allowed: 60 minutes  
Number of questions: 21

Finish Help

**Question 1** (1 point)  
Wear safety glasses or goggles while performing experiments.  
 a. True  
 b. False  
Save answer

**Question 2** (1 point)  
Possess and know the location of a first-aid kit before performing experiments  
 a. True  
 b. False  
Save answer

**Question 3** (1 point)  
Never taste any chemical used in this laboratory.  
 a. True  
 b. False  
Save answer

**Question 4** (1 point)

Time Remaining: 59 : 35 (min:sec)

Question Status:  
Unanswered  
Answered  
Answer not saved

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21				

## Safety Photos



C\_N.jpeg



Cambell.JPG



Chemistry.jpg



KateDiane.jpeg



Kylse.jpeg



lab pic.bmp



Lim.jpeg



Tran.jpeg



WaltKevin.jpeg

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## Activities and Exercise

Math Basic

Dimensional Analysis

**Chemical Vs. Physical change**

Electron Configuration

Chemical Nomenclature

Building Molecular Models

Balancing Chemical Equations

Stoichiometry Exercise

Modeling IMF

Concentration Calculations

Chemical Equilibrium

pH Acid Base Calculations

## Chemical Vs Physical Change

CHEM 100L - 74826 - Fundamentals Of

Chemistry Lab - Fall 06 - F. Garces

Homepage > Activities Exercises > Activity03 -

### Table of Contents

1. Chemical Vs. Physical Exercise (HTML)
2. Chemical Vs. Physical Exercise (PDF)
3. Chemical Vs. Physical Exercise (WebCT)

## Html or WebCT

The screenshot shows a WebCT interface for a course titled 'CHEM 100L - 74826 - Fundamentals Of Chemistry Lab - Fall 06 - F. Garces'. The page is titled 'Activity03' and contains a 'Table of Contents' with three items: 'Chemical Vs. Physical Exercise (HTML)', 'Chemical Vs. Physical Exercise (PDF)', and 'Chemical Vs. Physical Exercise (WebCT)'. The main content area is titled 'Chemical Vs. Physical Change' and includes a 'Lab Partner' and 'Date' field. Below this, there is a paragraph of text: 'Think about the following actions. If materials are available, carry out the procedure and carefully observe what happens. Determine if a physical change ( $\Delta$  Phys) is the sole factor of the observation or if a chemical change ( $\Delta$  Chem) is responsible for the observation.' This is followed by a link: 'Link here to see Physical Vs. Chemical change, the movie or click at the different segments below.' At the bottom, there is a table with three columns: 'Activity', 'Observation or Evidence', and 'Chemical or Physical Change'. The first row is '1 Lighting a match' and the second row is '2 Crushing chalk'.

Phy Vs. Chem

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## Experiments

Penny for your thought, Scientific Method

Mass, Volume Measurement

Separation of Ternary Mixture

Observations of Chemical Reactions

**Studying and Writing Chemical Reactions**

Counting by Weighing via the Mole

Causes of Intermolecular Forces

Density Solubility and Miscibility

Total Dissolve Solids (TDS) Conc.

Reactions at Equilibrium

pH Scale using Indicators

## Studying & Writing Ch Rxn

CHEM 100L - 74826 - Fundamentals Of Chemistry Lab - Fall 06 - F. Garces

Homepage > Experiments > Experiment04: Observation of Chemical Reactions

**Table of Contents**  
Experiment05: Observation of Chemical Reactions

Read the html file when viewing from your computer but download and print the pdf file when you want a hard copy.

Use the data sheet as a guide on what to write in your notebook.

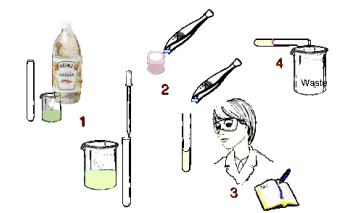
For the lab, you need to write a title and the objective of the experiment. Write the procedures as you perform the experiment and the observations you encounter. Write any data that you collect. Summarize the data in a table, then use this data to complete your calculations, and/or write chemical reactions if you have to. Finally draw a conclusion on the findings of the experiment and write a summary of what you learn from the experiment. If your write-up is complete, then the lab you wrote will have all of that information. You can now use the results from your lab notebook to fill the answer when you go back to Webct to input your answer in the quiz engine.

If you are confuse, please email or phone me to clarify.

**Html** of Chemical Reactions (HTML) of Chemical Reactions (PDF) ents > Experiment04: ... > Experiment04: ...

Discussions

(Digital Picture): Take a picture of the vinegar reacting with the magnesium.) Pour the content in a beaker, remove all unreacted magnesium and place it in a clean test tube and stopper it. Wash the vinegar down the drain. Turn on the magnesium as waste when meeting back in the lab. Wash all test tube and beaker used in this experiment and dry.



Decomposition  $H_2O$

# Chem100 Lab F06

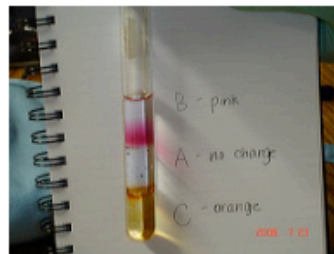
## Sample Photos: Results



1.jpeg



8.jpeg



4.jpeg



2.jpeg



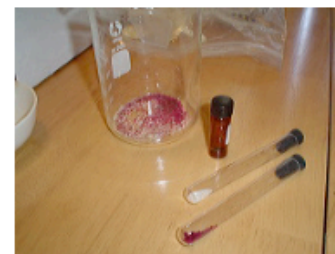
3.jpg



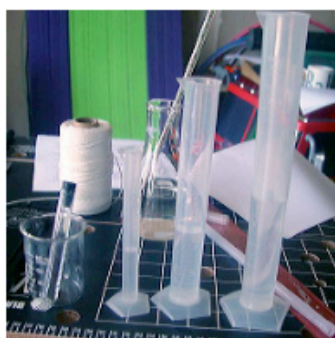
1.jpeg



6.jpg



1.jpg





# Chem100 Lab F06

## Lab Notebook

### Keeping a Lab Notebook.

The lab notebook required for this part of the lab is shown to the right. You can purchase this type of composition notebook from any Staples, Office Depot, Target, Longs Drugs or Wal-Mart.



The following is the format for keeping a lab notebook of the experiments that you will be doing in this class. The idea of a laboratory notebook is that this is your record of experiments performed and phenomena observed.

Although the laboratory notebook does not have to be perfectly pristine, it is certainly desirable that it should be as organized as possible. Some time and thought spent in planning before beginning an experiment, will result in a better notebook and a more successful experiment.

#### Notebook Format:

##### I. Heading

For each experiment in clued the following at the very top line of each page

1. Title - The title of the experiment. Use the same title as that of the lab manual
2. Date & Time - Write the date and time in which that particular page of the notebook is complete
3. Lab Partner - Write the name of the co-investigator who helped you completing this experiment.

II Objective - Write the purpose of the experiment. You can reword the objective as written in the lab manual.

III Procedure - Briefly write what you did in this experiment. How did you set up the experiment? Did you have to modify the directions? What problems did you encounter if any? You should also include a description of what materials you used, whether the lab kit supplied the equipment, was obtained from the lab locker in A117, or was purchased by you. It is also recommended that you sketch a diagram of the setup.

IV. Data and observation - Write down what you observed while performing the experiment. Write down results of the experiment as the experiment unfolds. Try not to arrive at any conclusions as to why the result that you are seeing is occurring. Simply write what you see and the data that the experiment generated.

VI. Results and Calculations - Calculate the results, or compile a table of results summarizing the findings of this experiment. Try to present the result in an organized table.

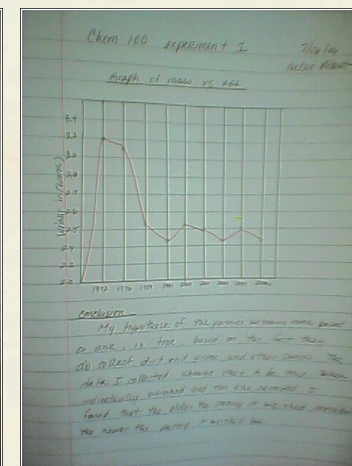
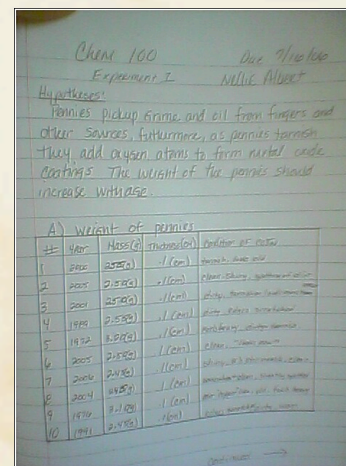
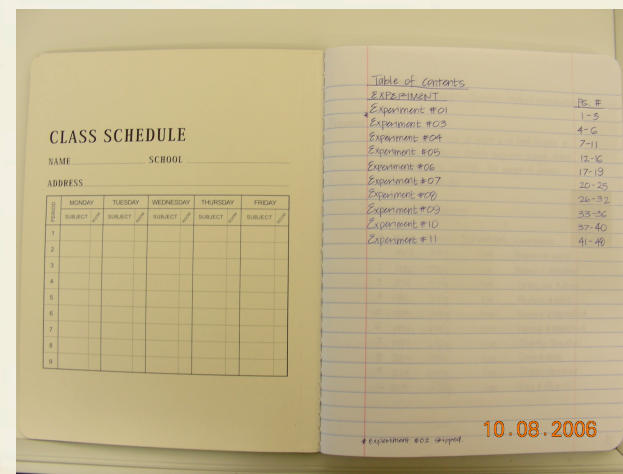
VI. Interpretation of results - Write how you would interpret the results. What do the results mean in the context of the objective of this experiment. Write the conclusions can you draw from the results of the experiment.

V. Summary - Write a summary of the overall experiment.

1. What did you learn?
2. What difficulties did you encounter?
3. How long was the duration of the experiment

V. Improvement suggestions - Write what you liked about the experiment and why you liked it and what you disliked about the experiment and why you disliked it. Give the experiment a score of 0 to 5.

0 (Not worth doing, didn't learn anything) - 3 (Average) - 5 (Pretty cool experiment, learned a lot.)



# Chem100 Lecture ... Lab

## Lecture F01

- HW 15%
- Portfolio 20%
- 4 Exam<sup>OL</sup> 40%
- Final Exam<sup>OL</sup> 25%

## Lecture F06

- HW / Participation 20%
- Project 5%
- 4 Quiz<sup>OL</sup> 20%
- MidTerm<sup>MMC</sup> 25%
- Final Exam<sup>MMC</sup> 30%

## Lab F03

- 12 Experiment 60%
- 13 Activity 26%
- 3 Quiz 12.5%
- LabTech 1.5%

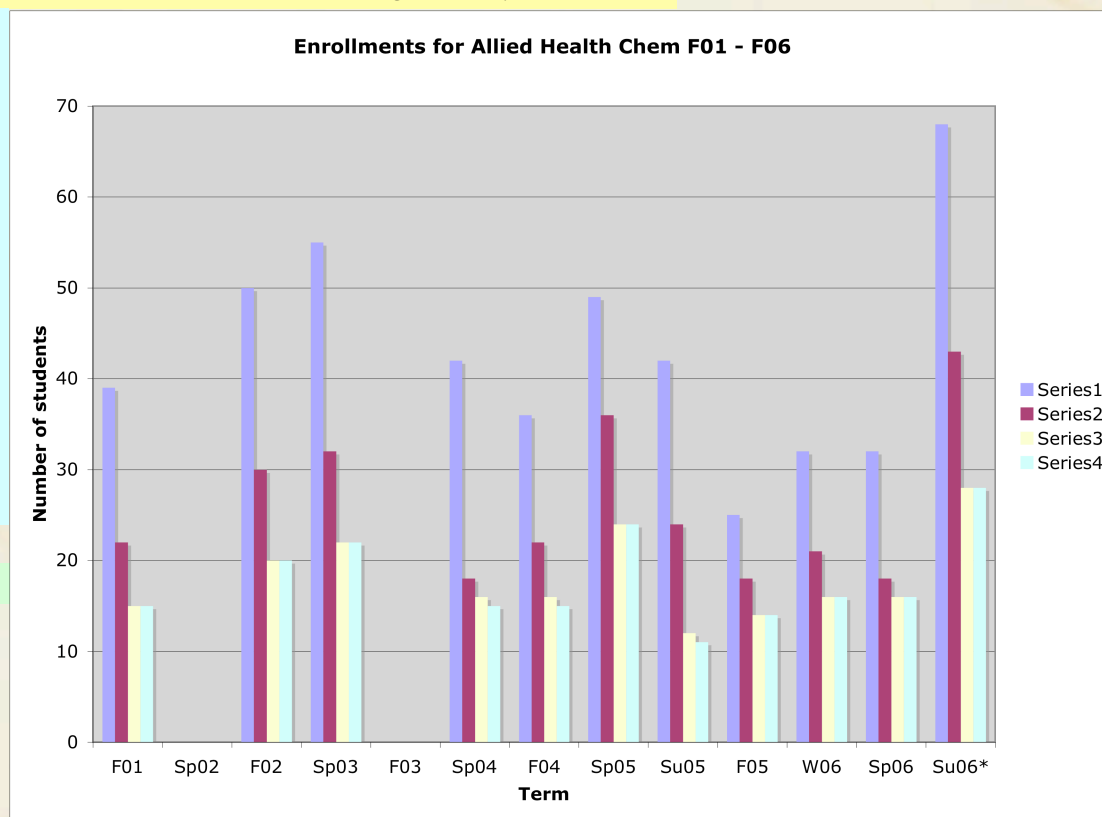
## Lab F06

- 10 Experiment 40%
- 13 Activity 32.5%
- 3 Quiz 17.5%
- Notebook 5%
- LabTech 5%

# Enrollments Statistics

## Chem 100 Lecture Online F01 - Su06 11-Terms

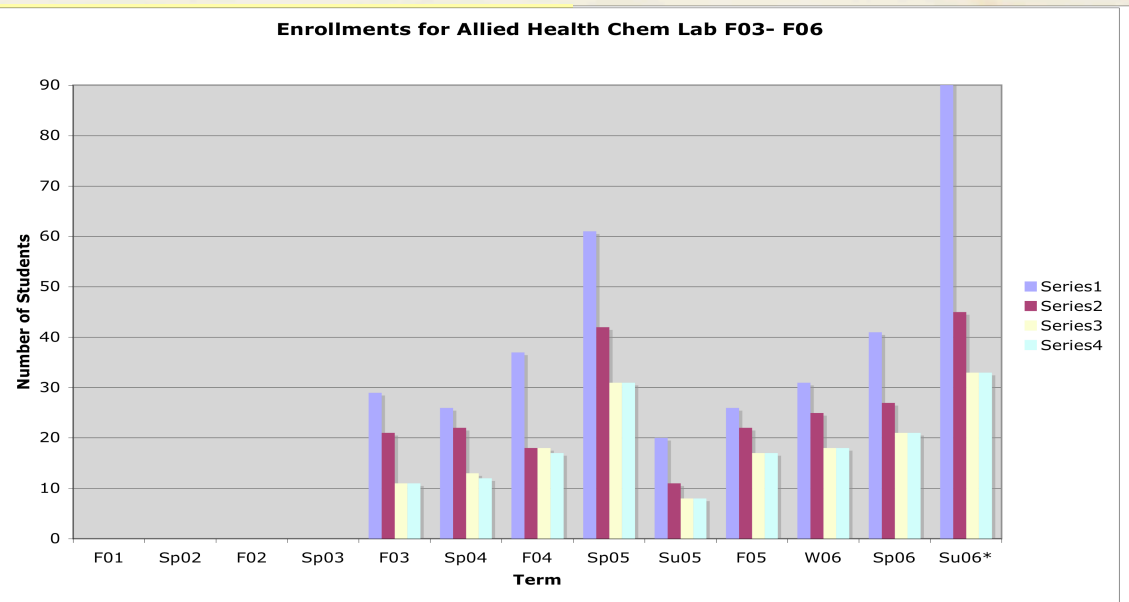
Lecture	Year	Total Enroll	at census	Withdr awl	Grade	% Retn	A	B	C	D	F	I
	F01	39	22	15	15	68						
	Sp02											
	F02	50	30	20	20	67						
	Sp03	55	32	22	22	69						
	F03											
	Sp04	42	18	16	15	83						
	F04	36	22	16	15	68						
	Sp05	49	36	24	24	67						
	Su05	42	24	12	11	46						
	F05	25	18	14	14	78						
	W06	32	21	16	16	76						
	Sp06	32	18	16	16	89						
	Su06*	68	43	28	28	65						
	F06											
<b>Total</b>	<b>13 Term.</b>	<b>470</b>	<b>284</b>	<b>199</b>	<b>196</b>	<b>69</b>						



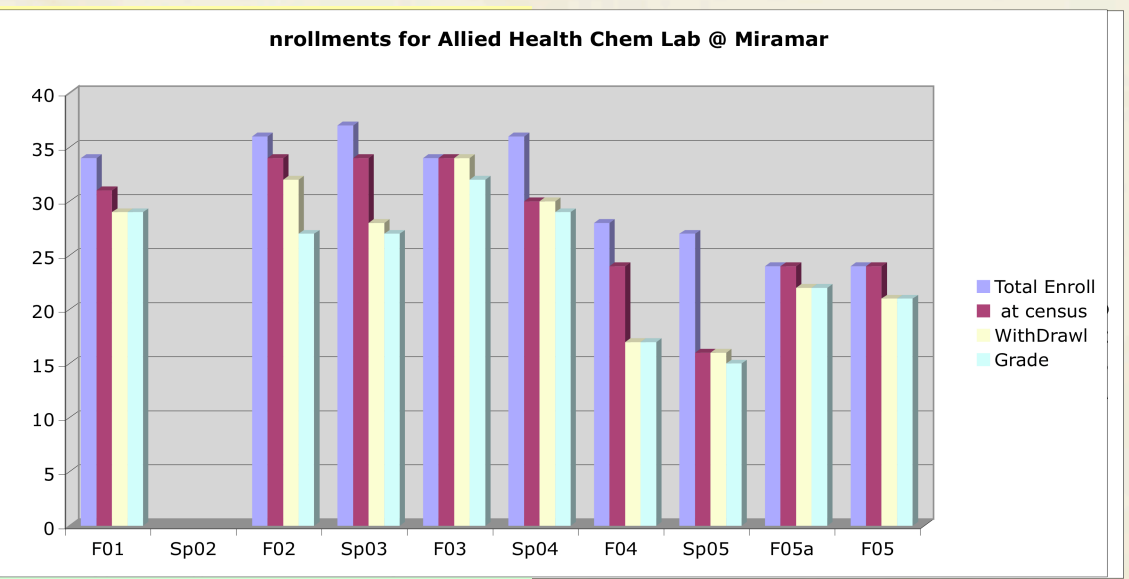
# Enrollments Statistics

## Chem 100 Online Lab F03 - Su06; 9-Terms

Lab	Year	Total Enroll	at census	With-drawl	Grade	% Retn
	F01					
	Sp02					
	F02					
	Sp03					
	F03	29	21	11	11	52
	Sp04	26	22	13	12	59
	F04	37	18	18	17	100
	Sp05	61	42	31	31	74
	Su05	20	11	8	8	73
	F05	26	22	17	17	77
	W06	31	25	18	18	72
	Sp06	41	27	21	21	78
	Su06*	91	45	33	33	73
	F06					
<b>Total</b>	<b>9 Terms</b>	<b>362</b>	<b>233</b>	<b>170</b>	<b>168</b>	<b>73</b>



Ch100	Year	Total Enroll	at census	With drawl	Grade	% Retn
MMC	F01	34	31	29	29	94
	Sp02					
	F02	36	34	32	27	79
	Sp03	37	34	28	27	79
	F03	34	34	34	32	94
	Sp04	36	30	30	29	97
	F04	28	24	17	17	71
	Sp05	27	16	16	15	94
	F05a	24	24	22	22	92
	F05	24	24	21	21	88
	W06					
	Sp06					
	Su06*					
	F06					
<b>Total</b>	<b>9 Terms</b>	<b>173</b>	<b>152</b>	<b>140</b>	<b>136</b>	<b>89</b>





# Traditional Vs. Online

- In general, there is a bigger attrition rate for students online (16% increase)
- The educational experience for both online and traditional students are about the same. It depends on what the students put into the course.
- Online students benefit greatly with extra face to face meetings and review sessions.
- Online courses are a work in progress and need constant adjustments

# Acknowledgements

## Natural Science

Sandra Slivka

Daphne Figueroa

Ric Matthews

## Online Colleagues

Teressa Toto

Mary Bernard

Berta Cuaron

## SDCCD Online

Judy Baker

Mary Kingsley

Peter Miles

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