

**California State University, Fresno**  
**School of Agricultural Sciences and Technology**  
**Department of Plant Science and Mechanized Agriculture**  
**Fall Semester**

**Course Instructor:**

**Office Location:** Graduate Laboratory Office **Phone:** 278-4155

**Lecture:**

**Location :** Graduate Laboratory, 2902 E. Barstow (near Chestnut & Barstow)

**e-mail:** denisb@csufresno.edu

### **Course Outline**

#### **AGRI 201**

#### **Agricultural Laboratory Techniques**

**Office Hours:**

**Location :** Graduate Laboratory, 2902 E. Barstow (near Chestnut & Barstow)

#### **Nature of the Course**

This course focuses on agricultural problem solving through the application of advances in laboratory technology to animal science, food science and plant science. Theory and operation of scientific instruments and techniques are taught.

#### **Goals and Objectives:**

1. For students to develop the laboratory skills needed to complete graduate thesis research.
2. For students to become informed consumers of laboratory methods and results.
  - a. Evaluate and select analytical methods.
  - b. Evaluate results provided by laboratories.
3. For students to be able to apply analytical methods to specific agricultural problems.
4. For students to demonstrate a knowledge of laboratory instruments, methods and safety.
5. For students to learn basic analytical chemistry principles.
  - a. Precision b. Accuracy c. Working range d. Resolution e. Detection limit
  - f. Interference g. Standards h. Matrix i. Sample preparation j. Sampling
6. For student to be able to use computers for communication (e-mail) and data manipulation.

#### **Recommended Text**

Kenkal, J. (1994) Analytical Chemistry for Technicians, published by CRC press- this book will be put on reserve at the CSUF library.

## Grading

- C =** 1.) Scores  $\geq 80\%$  on tests designed to demonstrate a student's knowledge and understanding of laboratory techniques.
- B =** 1.) Scores  $\geq 80\%$  on tests designed to demonstrate a student's knowledge and understanding of laboratory techniques  
2.) Scores  $\geq 80\%$  or higher on tests and assignments designed to demonstrate a student's problem solving skills.
- A =** 1.) Scores  $\geq 85\%$  on tests designed to demonstrate a student's knowledge and understanding of laboratory techniques.  
2.) Scores  $\geq 85\%$  or higher on tests and assignments designed to demonstrate a student's problem solving skills.  
3.) Scores  $\geq 80\%$  or better on assignments designed to demonstrate a student's ability to modify and evaluate laboratory methods.

## Assignments, quizzes and exams.

1. There will be 10 take-home quizzes that cover basic chemistry and statistic principles (10pts/ quiz). The best 7 of 10 will be used for grading.
2. There will be 2 midterms and one comprehensive final
3. There will be five full lab reports 10 pts/ lab. The best four of five will be used.
4. There will be 8 lab results due (5 points/ result). Points awarded based on how close number is to true value (T.V.). 5 pts = T.V.  $\pm 3\%$ , 4 pts = T.V.  $\pm 6\%$ , 3 pts = T.V.  $\pm 9\%$ , 2 pts = T.V.  $\pm 12\%$ , 1 pts = T.V.  $\pm 15\%$ .
5. Each group will review the lab report of another group (10pts/review) (four reports total).
6. Each group will complete a special lab procedure and present the results in class. This project will be decided by the group in consultation with the instructor (50pts).
7. Each group will present on an analytical chemistry topic of their choice (in consultation with the instructor (50pts).

## Scoring System for grades

Description	Knowledge	Application	Evaluation
Quizzes (best 7 of 10)		70	
midterm 1	50	50	
midterm 2	50	50	
Final (comprehensive)	100	100	
Lab reports (4)		40	40
Lab results (8)		40	
Special Project (1)			50
Lecture presentation(1)			50
Total	200	325	100
80% grade	160	260	112
	C	B	A

All assignments must be completed to receive a passing grade.

**Agri 201- Laboratory Techniques**  
**Fall 1995**

**Lecture Schedule**

<b>Week</b>	<b>Date</b>	<b>Topic Description</b>
1	8/29	Overview of laboratory methods
2	9/5	volumetric and gravimetric analysis
3	9/12	Statistics, Quality Assurance & Sampling
4	9/19	pH measurement and buffers
5	9/26	Kjeldahl
6	10/3	ion selective electrodes <b>(1st Test)</b>
7	10/10	spectrophotometry, NIR
8	10/17	Atomic absorption, ICP & emission spectrophotometry
9	10/24	Chromatography, HPLC,
10	10/31	Chromatography GC
11	11/7	Electrophoresis, Capillary Electrophoresis <b>(2nd Test)</b>
12	11/14	Bioassays
13	11/21	ELISA
14	11/28	Microscopy, Light, SEM
15	12/5	To be announced
16	12/12	To be announced

**Lab Schedule**

<b>Week</b>	<b>Date</b>	<b>Lab Description</b>
1	8/31	Introduction- Safety, basic chemistry, overview
2	9/7	Volumetrics- Precision & accuracy <b>(Report due 9/28)</b>
3	9/14	Titration- Acid/Base <b>(Report due 10/5)</b>
4	9/21	pH and buffers
5	9/28	Total N by Kjeldahl- digestion/ dry ashing
6	10/5	Total N by Kjeldahl- distillation <b>(Report due 10/26)</b>
7	10/12	ISE- Nitrate analysis <b>(Report due 11/3)</b>
8	10/19	Spectrophotometry- P analysis <b>(Report due 11/9)</b>
9	10/26	Atomic Absorption- Calcium <b>(Report Due 11/30)</b>
10	11/2	Atomic Emission- Potassium <b>(Reprot due 11/30)</b>
11	11/9	Bioassay - 2,4,D <b>(Report Due 11/30)</b>
12	11/16	Special Project <b>(Report Due 12/14)</b>
13	11/23	Thanksgiving
14	11/30	Chromatography <b>(Report due 12/14)</b>
15	12/7	Electron Microscopy
16	12/14	Presentations