

# CHM 345: Introduction to Analytical Chemistry

Fall 2014

## Course Instructor:

Dr. Bin Wang

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Office Hours: Monday & Wednesday 1:00-4:00 pm

**Course Prerequisites:** CHM 212 & CHM 218

**Lectures:** S-465, Tuesday & Thursday 12:30-1:20 pm

**Textbook:** Quantitative Chemical Analysis, 8<sup>th</sup> edition, by Daniel C. Harris

**ACS Academic Lab Safety Guide:**

[http://portal.acs.org/portal/PublicWebSite/about/governance/committees/chemicalsafety/publications/WPCP\\_012294](http://portal.acs.org/portal/PublicWebSite/about/governance/committees/chemicalsafety/publications/WPCP_012294)

**Labs:** S-492, Tuesday & Thursday 1:30-3:15 pm

**Lab Requirements:** Lab goggles and a bound laboratory notebook

## Course Description:

Introduction to the basic principles of Analytical Chemistry including traditional wet methods and contemporary instrumental methods of chemical analysis.

## Course Objectives:

1. To learn how to analyze results through statistical methods.
2. To learn chemical equilibrium, titrations, and basic knowledge of electrochemistry.
3. To develop wet laboratory techniques essential for high precision experimentation.
4. To acquire the ability to operate advanced instrumentation and to interpret results through modern theory.

**Grading:** Homework 20%, Quizzes 15%, Labs 40%, and Final Exam 25%

Grading Scale: A 90-100 B 80-89 C 70-79 D 60-69 F < 60

## Attendance:

Attendance for this class is not mandatory. Absences from quizzes and laboratories can only be made-up if the absence falls within one of the categories outlined in the undergraduate catalog. To make-up a quiz or lab, you will need to follow the process for securing an excused absence. All excused absences must be obtained as soon as possible.

## Course Policies:

1. Homework and lab reports will not be accepted after their due dates.
2. Graphing calculators, calculators with alphanumeric programming, and calculators on cell phones, PDAs, etc. cannot be used during quizzes/exams. Likewise, sharing of calculators during quizzes/exams is prohibited.
3. During quizzes/exams, all materials necessary will be provided to you except a pencil and calculator. You may NOT use your own paper, etc.
4. Please turn off cell phones during class, failure to do so may result in dismissal from lecture.

- Students with disabilities who require special accommodations will be made.  
[www.marshall.edu/disabled](http://www.marshall.edu/disabled).
- Academic dishonesty will be dealt with as outlined in the undergraduate catalog.

### **Tentative Schedule:**

	Tuesday	Thursday
Week 1 8-26, 8-28	Chapter 0,1,2 Introduction <span style="color: blue;">HW</span> <i>No Lab</i>	Chapter 3,4 Statistics <span style="color: blue;">HW</span> Lab 1: Balance (check in)
Week 2 9-2, 9-4	Chapter 4 Statistics <span style="color: blue;">HW</span> Lab 1: Volumetric Techniques	Chapter 26 Gravimetric Analysis <span style="color: blue;">HW</span> Lab 2: Grav. Cl
Week 3 9-9, 9-11	Chapter 5 Calibration Methods <span style="color: red;">Quiz1</span> Lab 2: Grav. Cl	Chapter 6 Chemical Equilibrium <span style="color: blue;">HW</span> Lab 2: Grav. Cl
Week 4 9-16, 9-18	Chapter 6,7 Chemical Equilibrium <span style="color: blue;">HW</span> Lab 3: Standardization of NaOH	Chapter 7 Activity <span style="color: red;">Quiz2</span> Lab 3: KHP Unknown
Week 5 9-23, 9-25	Chapter 8 Monoprotic Equilibria <span style="color: blue;">HW</span> Lab 4: Standardization of HCl	Chapter 9 Polyprotic Equilibria <span style="color: blue;">HW</span> Lab 4: Soda Ash Unknown
Week 6 9-30, 10-2	Chapter 10 Acid-Base Titrations <span style="color: blue;">HW</span> Lab 5: pH Determination	Chapter 11 EDTA Titrations <span style="color: red;">Quiz3</span> Lab 6: Titration Curve
Week 7 10-7, 10-9	Chapter 13,15 Electrochemistry <span style="color: blue;">HW</span> Lab 6: Unknown Weak Acid	Chapter 13,14 Nernst Equation <span style="color: blue;">HW</span> Lab 7: [Cl <sup>-</sup> ] and the Nernst Equation
Week 8 10-14, 10-16	Chapter 14 Electrodes <span style="color: red;">Quiz4</span> Lab 7: [Cl <sup>-</sup> ] and the Nernst Equation	Chapter 17 Intro. Spectroscopy <span style="color: blue;">HW</span> <i>No Lab</i>
Week 9 10-21, 10-23	Chapter 17,18,19 UV-Vis <span style="color: blue;">HW</span> Lab 8: UV	Chapter 17,19 Vibrational Spec. <span style="color: blue;">HW</span> Lab 8: UV
Week 10 10-28, 10-30	Chapter 17,18 Luminescence <span style="color: red;">Quiz5</span> Lab 9: IR	Chapter 20 Atomic Spectroscopy <span style="color: blue;">HW</span> Lab 9: IR
Week 11 11-4, 11-6	NMR Spectroscopy <span style="color: blue;">HW</span> Lab 10: Fluorescence	Chapter 21 Mass Spectrometry <span style="color: red;">Quiz6</span> Lab 10: Fluorescence
Week 12 11-11, 11-13	Chapter 22 Intro. Separations <span style="color: blue;">HW</span> Lab 11: Paper Chromatography	Chapter 23 Gas Chromatography <span style="color: blue;">HW</span> Lab 12: GC (check out)
Week 13 11-18, 11-20	Chapter 24 HPLC <span style="color: red;">Quiz7</span> Lab 12: GC (check out)	Chapter 24 HPLC <span style="color: blue;">HW</span> Lab 13: HPLC
Week 14 11-25, 11-27	<i>Thanksgiving/Fall Break</i>	<i>Thanksgiving/Fall Break</i>
Week 15 12-2, 12-4	Chapter 25 CE <span style="color: blue;">HW</span> Lab 13: HPLC	Review <span style="color: red;">Quiz8</span>
Week 16 12-9	Final Exam, 12:45-2:45 pm	

### **Suggested Activities for Success:**

- Read the suggested material from the textbook before and after each lecture.
- Try to work through every homework problem assigned no matter how difficult.
- Always attend class and take good notes.
- Seek help from others, some possibilities:
  - Take advantage of office hours.
  - Work in small groups on studying for quizzes and the final.
- Exercise regularly and maintain a healthy diet.