

# CHM 345: Introduction to Analytical Chemistry

Fall 2015

## Course Instructor:

Dr. Bin Wang

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

**Course Prerequisites:** CHM 212 & CHM 218 (Minimum Grade of C)

**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://www.acs.org/content/dam/acsorg/about/governance/committees/chemicalsafety/publications/safety-in-academic-chemistry-laboratories-students.pdf>

**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 20%, Labs 40%, and Final Exam 20%

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

## Attendance:

Attendance for this class is highly recommended. 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.

<http://www.marshall.edu/academic-affairs/policies/>.

## 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.

- 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 8-25, 8-27	Chapter 0,1,2 Introduction <i>No Lab</i>	Chapter 3,4 Statistics HW1 Lab 1: Balance (Lab check in)
Week 2 9-1, 9-3	Chapter 4 Statistics HW2 Lab 1: Volumetric Techniques	Chapter 26 Gravimetric Analysis HW3 Lab 2: Grav. Cl
Week 3 9-8, 9-10	Chapter 5 Calibration Methods Quiz1 Lab 2: Grav. Cl	Chapter 6 Chemical Equilibrium HW4 Lab 2: Grav. Cl
Week 4 9-15, 9-17	Chapter 6,7 Chemical Equilibrium HW5 Lab 3: Standardization of NaOH	Chapter 7 Activity Quiz2 Lab 3: KHP Unknown
Week 5 9-22, 9-24	Chapter 8 Monoprotic Equilibria HW6 Lab 4: Standardization of HCl	Chapter 9 Polyprotic Equilibria HW7 Lab 4: Soda Ash Unknown
Week 6 9-29, 10-1	Chapter 10 Acid-Base Titrations HW8 Lab 5: pH Determination	Chapter 11 EDTA Titrations Quiz3 Lab 6: Titration Curve
Week 7 10-6, 10-8	Chapter 13,15 Electrochemistry HW9 Lab 6: Unknown Weak Acid	Chapter 13,14 Nernst Equation HW10 Lab 7: [Cl <sup>-</sup> ] and the Nernst Equation
Week 8 10-13, 10-15	Chapter 14 Electrodes Quiz4 Lab 7: [Cl <sup>-</sup> ] and the Nernst Equation	Chapter 17 Intro. Spectroscopy HW11 <i>No Lab</i>
Week 9 10-20, 10-22	Chapter 17,18,19 UV-Vis HW12 Lab 8: UV	Chapter 17,19 Vibrational Spec. HW13 Lab 8: UV
Week 10 10-27, 10-29	Chapter 17,18 Luminescence Quiz5 Lab 9: IR	Chapter 20 Atomic Spectroscopy HW14 Lab 9: IR
Week 11 11-3, 11-5	Chapter 21 Mass Spectrometry Quiz6 Lab 10: Fluorescence	Chapter 22 Intro. Separations HW15 Lab 10: Fluorescence
Week 12 11-10, 11-12	Chapter 23 Gas Chromatography HW16 Lab 11: GC (Lab check out)	Chapter 22 Band Spreading Quiz7 Lab 11: GC (Lab check out)
Week 13 11-17, 11-19	Chapter 24 HPLC HW17 Lab 12: HPLC	Chapter 24,25 HPLC, CE HW18 Lab 12: HPLC
Week 14 11-24, 11-26	<i>Thanksgiving/Fall Break</i>	<i>Thanksgiving/Fall Break</i>
Week 15 12-1, 12-3	Chapter 25 CE, Lab-on-a-Chip Quiz8 Lab 13: Lab-on-a-Chip	Review Lab 13: Lab-on-a-Chip
Week 16 12-8	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.