

# CHEMISTRY 311

## Syllabus for Lecture

### Fall 2009

**Professor:** Dr. Evans

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**Office hours:** MWF 10:00-11:00 or by appointment

**Office:** RM Science 1-084

**Class:** Analytical 1, CHEM 311

**Lecture:** MWF 11:00-11:50 in Science2- 065

**Recitation:** F 12:00-12:50 in Science 2-065 (attendance mandatory!!!)

**Objective:** The underlying theme for much of this course is chemical equilibrium. In addition, the course will focus on chemical techniques, both traditional wet chemistry approaches, such as titrations, and instrumental methods, that are applicable for the quantitative and qualitative analysis of a variety of different samples. Topics will include solubility, acid-base chemistry, electrochemistry, spectroscopy, and separation science. The theory behind these techniques will be covered, as well as some practical guidelines that are useful when performing such experiments. I hope you will enjoy the semester.

**Text:** Quantitative Chemical Analysis, 7<sup>th</sup> Edition by Harris (green cover)

**Grading:** 3 Exams 25 %, 100 pts each

**Quizzes:** 10 quizzes, 25 %, 10 pts each. The quizzes will most often consist of one multiple choice problem that will be taken on-line through Blackboard Vista. You must log-on between Friday at noon and Wednesday at 9:00 AM to take the quiz. The quiz will cover material discussed in lecture the previous week. You will have only 25 minutes to take the quiz and submit your answers, once you begin the quiz.

Blackboard Vista

<http://www.boston.umassonline.net/index.cfm>

#### Grading Scale:

Total points	Grade	Total points	Grade
370-400	A	275-294	C
355-369	A-	260-274	C-
340-354	B+	250-259	D+
325-339	B	230-249	D
310-324	B-	220-229	D-
295-309	C+	< 220	F

**There will be no make up exams or quizzes!** If you miss an exam **for any reason**, the average of the other two exam grades will take its place. However, if you miss an exam you must have a **legitimate reason** (flat tire, death in the family, spent the night in the emergency room, involved in a traffic accident, ect.). If you miss, a second exam **for any reason**, you will receive a score of **zero for that exam**.

**Attendance:** You are expected to attend all lectures and recitations

**Academic dishonesty:** If there is any question in your mind about whether or not the action you are about to undertake constitutes cheating, IT DOES, and DO NOT PROCEED!! If you do proceed you will likely be caught (we have sneaky ways of catching you) and you will FAIL the course and be DISMISSED from the university!

**Suggested Problems:**

I have suggested over 170 problems. You should make a good attempt at all of them!! If each problem takes you 20 minutes, that equates to about 56 hours. **Be disciplined and do at least 2 problems a day, EVERY DAY!!!** I can not overstate the importance of this last point to the likelihood of your success in this course.

**Lecture Schedule:**

You can click on the chapter, ie. "Chapter 6", to obtain lecture notes. Click on the problems to obtain the solutions.

Week of	Notes and Suggested Problems	Material
Sept. 9-11	Chapter 6	Chemical equilibria,
Suggested problems	Exercises 6-A, 6-B, 6-H, Prob 6-3, 6-4, 6-6, 6-9, 6-10, 6-14, 6-16, 6-19, 6-25, 6-31, 6-36 6-37, 6-49, 6-50, 6-54, 6-56	No quiz the first week
Sept. 14-18	Chapters 9 and 10	Weak acid equilibria, buffers, and polyprotics
Suggested problems	Prob 9-A, 9-B, 9-E, 9-1, 9-2, 9-5, 9-6, 9-8, 9-13, 9-19, 9-20, 9-21, 9-24, 9-26, 9-32, 9-33, 9-37, 9-38, 10-A, 10-4, 10-6, 10-11, 10-17, 10-18, 10-22, 10-23, 10-24, 10-26, 10-29, 10-31, 10-38,	quiz 1, ch 6
Sept. 21-25	Chapter 7 and 8	Titration and activity
Suggested problems	Prob 7-A, 7-B, 7-7, 7-11, 7-12, 7-13, 7-16, 7-28, 7-36, 8-4, 8-6, 8-8, 8-9, 8-11, 8-12	quiz 2, ch 9
Sept 28-Oct 2	Chapter 11	Acid base titrations

Suggested problems	Prob 11-A-C, 11-6, 11-7, 11-15, 11-17, 11-18, 11-22, 11-23, 11-27, 11-29, 11-30, 11-36, 11-43, 11-47, 11-57, 11-60	quiz 3, ch 11
Oct 5-9	Chapter 12 and 13	Systematic treatment and EDTA
Suggested problems	Prob 12-A, 12-4, 12-5, 12-7, 12-15, 12-17, 12-31, 12-35, 12-36, 13-G	quiz 4, ch 12
Oct 14	Review	
Oct 16	Exam 1	Ch 6-13
Oct. 19-23	Chapter 14	Electrochemistry
Suggested problems	Prob 14-B, 14-C, 14-F, 14-5, 14-13, 14-16, 14-18, 14-20, 14-21, 14-26, 14-28, 14-32, 14-33, 14-39	quiz 5, ch 14
Oct. 26-30	Chapter 15	Electrochem and electrodes
Suggested problems	Prob 15-2, 15-3, 15-4, 15-8, 15-9, 15-14, 15-15, 15-18, 15-26, 15-30, 15-32, 15-34, 15-36, 15-38, 15-39, 15-42, 15-43, 15-44	quiz 6, ch 15
Nov. 2-6	Chapter 16 and intro to ch. 18	Redox titrations
Suggested problems	Prob 16-2, 16-3, 16-4, 16-10, 16-11, 16-14, 16-15, 16-18, 16-19, 16-24, 16-25, 16-27, 16-30	Nov. 6, quiz 7, ch 16
Nov. 9-13	Chapter 18 and 19	Fundam. of spectroscopy and applications
Suggested problems	Prob 18-2, 18-4, 18-11, 18-13, 18-19, 19-1, 19-2, 19-5, 19-8, 19-9, 19-12, 19-18, 20-3, 20-16, 20-29	quiz 8, ch 18/19
Nov. 16	Ch 20	UV-vis, fluorescence, FTIR
Nov. 18	Review	
Nov. 20	EXAM 2	Chapt 14-20
Nov. 23-25	Ch 21	Atomic spectroscopy and NMR
T-Day	Prob 21-6, 21-7, 21-11, 21-17, 21-18, 21-19	
Nov 30-Dec 4	Chapter 23 and 24	Intro to separations/GC

Suggested problems	Prob <u>23-1</u> , 23-2, 23-7, 23-15, 23-18, 23-21, 23-26, 23-27, 23-30, 24-1, 24-3, 24-6, 24-13, 24-15, 24-18, 24-20, 24-22	quiz 9, ch 22,23
Dec. 7-11	Chapter 24 and 22	HPLC /mass spectrometry
Suggested problems	Prob <u>22B</u> , 22-H, 25-19, 22-7, 22-24, 22-26, 22-29	quiz 10, ch 23,25
Dec 14	Review	
Dec. 16-22	EXAM 3 (semi-comprehensive)	