

**CHEMISTRY 864**  
Analytical Chemistry for High School Teachers  
University of Nebraska at Kearney  
Fall 2017

**Instructor:** Dr. Annette Moser  
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**Materials Required for Course**

1. Textbook: Exploring Chemical Analysis, Fifth Edition by Daniel C. Harris  
ISBN-13: 978-1-4292-7503-3, ISBN-10: 1-4292-7503-0
2. Sapling Learning subscription (available at <http://www.saplinglearning.com/>)
3. Calculator with log and scientific notation functions

**Grading Policy**

Your course grade will be calculated as follows:

Quizzes (12)	35%
Midterm Exams (3)	35%
Discussion Boards (3)	10%
Original Lesson Plan Assignment (1)	20%

Grades will be based on a 10% scale: 90+% = A, 80+% = B, 70+% = C, etc. A curve **MAY** be used to adjust grades upward (never downward). Do **NOT** count on the curve. Pluses and minuses will distinguish the borderline cases (within 1 – 2% of the cutoff). Grades will be posted on Canvas under the gradebook.

**QUIZZES** Quizzes will be given throughout the semester. The quizzes are not comprehensive and will be available through Sapling learning once a lecture has been posted. Each quiz is worth 25 points unless stated otherwise and must be completed by 11:00 p.m. CDT (CST after Nov 4) the following Tuesday.

**MIDTERM EXAMS** Midterm exams are not comprehensive. They will be based on material covered since the previous hour exam. Each exam is timed. The exam will be available through Sapling Learning once the last lecture of a given module has been posted. Exams must be completed by 11:00 p.m. CDT (CST after Nov 4) the following Friday.

**DISCUSSION BOARDS** For *each* of the three modules; you are required to answer the question, “How could this material be incorporated into the high school classroom” on the discussion boards. Within 3 days of the initial posting, you are required to respond to *two* of your classmates’ posts. Each discussion post will be graded based on a simple rubric which is posted on Canvas. Simple statements such as “I agree/disagree” will not count as valid responses. The instructor’s role in discussion activities will primarily be that of a moderator. Specific questions about the understanding of course material should be e-mailed directly to the instructor.

**ORIGINAL LESSON PLAN ASSIGNMENT** At the graduate level, one must develop the ability to create original instructional material from existing knowledge. As a term project, you are required to write an ***original 3-5 day lesson plan*** that introduces and/or reinforces one or more concepts from the covered material. Your write-up should include a lesson plan summary in the format that you would turn in to your principal or department head, detailed outlines (with full explanations of any example problems) of any lectures, full descriptions and “teacher notes” for any demonstrations, and complete handouts for any lab experiments (include a background section, procedural instructions for students, additional notes for teachers, and information on chemical hazards, safety, and storage considerations), homework assignments, and quizzes. A one-page topic proposal and plan outline must be turned in by October 30. Within a week, the instructor will evaluate the outline and return it with suggestions for the full assignment.

**SAPLING LEARNING** Exams and quizzes will be given using an online testing/homework site (Sapling Learning). As a part of this class, you will need to buy a one-semester subscription to this service for \$45.00.

**READING ASSIGNMENTS & TEXTBOOK PROBLEMS** Reading assignments and suggested textbook problems for each module will be posted on Canvas. It is strongly recommended that you read the text, listen to the posted lecture and work the suggested problems prior to taking the quizzes/exams.

**DEADLINES** The deadlines for all assignments and exams are listed on the last page of this syllabus. These deadlines will be strictly followed. The following penalties will be applied to late work:

Up to 24 hours late	25% of possible points (0 for discussion board response)
Between 24 – 48 hours late	50% of possible points (0 for discussion board response)
Over 48 hours late	Zero score

**ACADEMIC HONESTY** **Absolutely no cheating or plagiarism will be tolerated in the course.** Please refer to the student code of conduct that can be found at <http://www.unk.edu/uploadedFiles/admin/vcsa/StudentHandbook.pdf> (Articles III and IV are most relevant.)

The following penalties have been adopted by the Chemistry Department and shall be imposed for this class: For the first minor offense of academic dishonesty, a maximum penalty of zero grade on the assignment and further loss of a letter grade in the course will be imposed. Examples of minor offenses include but are not limited to: cheating on homework assignments, laboratory assignments, or quizzes; improper collaboration on assignments; limited plagiarism on written assignments; minor but not inadvertent lack of citation in written work etc. For a major offense or a repeated minor offense whether in a single class or from the combination of ANY other university course and a chemistry course, a maximum penalty of course failure will be imposed. Examples of major infractions include cheating on any exam, gross copying/plagiarism of another’s work in written work, fabrication of laboratory data, etc. All incidents of academic dishonesty shall be reported on the appropriate forms and sent to the department chair, college dean, and Senior Vice Chancellor’s office.

**STUDENTS WITH DISABILITIES OR THOSE WHO ARE PREGNANT** Students with disabilities or those who are pregnant are encouraged to contact me for a confidential discussion of their individual needs for academic accommodation. It is the policy of the University of Nebraska at Kearney to provide flexible and individualized reasonable accommodation to students with documented disabilities or those who are pregnant. To receive accommodation services for a disability, students must be registered with UNK Disabilities Services Coordinator, David Brandt, in the Academic Success Office, 163 Memorial Student Affairs Building, 308-865-8214 or by email [unkdso@unk.edu](mailto:unkdso@unk.edu). For those needing accommodation due to pregnancy, you need to visit with Student Health. The following link provides information for students and faculty regarding pregnancy rights. <http://www.nwlc.org/resource/pregnant-and-parenting-students-rights-faqs-college-and-graduate-students>

**REPORTING STUDENT SEXUAL HARASSMENT, SEXUAL VIOLENCE OR SEXUAL ASSAULT** Reporting allegations of rape, domestic violence, dating violence, sexual assault, sexual harassment, and stalking enables the University to promptly provide support to the impacted student(s), and to take appropriate action to prevent a recurrence of such sexual misconduct and protect the campus community. Confidentiality will be respected to the greatest degree possible. Any student who believes she or he may be the victim of sexual misconduct is encouraged to report to one or more of the following resources:

- **Local Domestic Violence, Sexual Assault Advocacy Agency** 308-237-2599
- **Campus Police (or Security)** 308-865-8911
- **Title IX Coordinator** 308-865-8655

Retaliation against the student making the report, whether by students or University employees, will not be tolerated. **If you have questions regarding the information in this policy please contact Mary Chinnock Petroski, Chief Compliance Officer ([petroskimj@unk.edu](mailto:petroskimj@unk.edu) or phone 8400).**

### **COURSE GOALS AND OBJECTIVES**

At the end of this course, students will

1. Know what equipment should be used for particular tasks in the analytical chemistry lab.
2. Know the importance of accuracy and precision and how to propagate error.
3. Have a basic understanding of how statistics are used in chemistry for data analysis.
4. Know how chemical activities effect basic equilibrium calculations.
5. Know how to calculate the concentration of various components in aqueous solution using equilibrium constants.
6. Know the theory behind gravimetric titrations and how to do simple gravimetric calculations.
7. Be able to predict the pH of various acid-base solutions and points along an acid-base titration.
8. Know the basic theory of redox reactions and how to calculate cell potentials under standard and non-standard conditions as well as points along a redox titration curve.
9. Have a basic understanding of the various electrochemical methods used in analytical chemistry and the information that can be obtained from each.
10. Know the theory behind of spectroscopy and how this affects molecular and atomic techniques.
11. Know basic chromatographic theory and how separations (GC, LC, and CE) occur and how each can be optimized.

### Class Schedule & Due Dates

		Quiz Due Date @ 11:00 p.m.	Exam Due Date @ 11:00 p.m.
<b>Module #1. Introduction to Analytical Chemistry, Data Analysis, Gravimetric Analysis, &amp; Solubility</b>			
Aug 23	Lecture #1 – Introduction, Laboratory Equipment, & Techniques	Aug 29	Sept 22
Aug 30	Lecture #2 – Accuracy, Precision, & Error	Sept 5	
Sept 6	Lecture #3 – Analytical Statistics & Quality Control	Sept 12	
Sept 13	Lecture #4 – Gravimetric Analysis & Solubility	Sept 19	
<b>Module #2. Acid-Base Titrations &amp; Equilibria</b>			
Sept 20	Lecture #5 – Acids & Bases	Sept 26	Oct 20
Sept 27	Lecture #6 – Buffers	Oct 3	
Oct 4	Lecture #7 – Acid-Base Titrations	Oct 10	
Oct 11	Lecture #8 – Polyprotic Acids & Bases	Oct 17	
<b>Module #3. Chemical Activity, Complex Equilibria, Gravimetric Analysis &amp; Titrations</b>			
Oct 18	Lecture #9 – Equilibrium Reactions & Chemical Activities	Oct 24	Nov 17
Oct 25	Lecture #10 – Complex Formation Equilibrium, Complexometric & Precipitation Titrations	Oct 31	
Nov 1	Lecture #11 – Redox Reactions & Cell Potentials & Electrodes	Nov 7	
Nov 8	Lecture #12 – Redox Titrations & Electrochemical Analysis Methods	Nov 14	

#### *Discussion Board Postings*

In addition to the exams and quizzes, you are also responsible for posting on the discussion board following each module. The initial postings are due the same day/time as the last quiz in each module (Sept 22, Oct 20, and Nov 17). A response to two of your classmates' postings is due the same day/time as the exams (Sept 25, Oct 23, Nov 20).

#### *Lesson Plan*

Topic proposal is due at 11:00 p.m. Monday, October 30. The final write-up is due at 11:00 p.m. CST Monday, November 20.

#### *Quizzes & Exams*

Quizzes and Exams will be posted the same day as the lecture. For example, Quiz #1 will be posted at Sapling Learning on Wednesday, Aug 23. Exam #1 will be posted at Sapling Learning on Wednesday, Sept 13.