Course Name: CHEM 212, 4 credits
Prerequisites: CHEM 106X, MATH F107X or equivalent
Location: REIC 165 (lecture); REIC 245 (lab)
Meeting Time: MWF 9:15-10:15am (lecture); M 2:15-5:15pm (lab)
Final: Wednesday, Dec 18, 8-10am

Instructor: Dr. Sarah Hayes. Call me Dr. Hayes
Office: Reichardt, 188
Phone: 907-474-7118
Email: s.hayes@alaska.edu
Office Hours: M 10:30-12, By appointment, or drop by when my door is open

Blackboard Link: http://classes.uaf.edu for grades only
Class website: http://analyticalchem.community.uaf.edu for all course content
Req’d Materials: Harris, Quantitative Chemical Analysis, 8th ed. (978-1429218153)
Lab Notebook- bound notebook

Course Description: This course addresses aqueous chemical equilibrium as applied to chemical analysis, separations, spectrophotometry, potentiometry and factors considered in the analytical approach. Lab portion will include introductory experiments in analytical and instrumental techniques. CHEM 212 builds on previous experience with general chemistry (106X or equivalent).

Instructional Methods: This class will be taught in a “flipped” manner, meaning lectures are prerecorded on video, posted on the course website, and watched before class. Time during the class will be spent interacting with material through group work, solving problems, etc. Graded assignments are due daily, according to schedule posted on website.

Course Goals: Students will learn to understand statistical treatment of data, the calculations underlying chemical equilibrium, and analytical techniques: titrations, spectrophotometry, mass spectrometry, and separations.

Student Learning Outcomes:
• Students will become adept at statistical treatment of data and equilibrium calculations. Don’t be afraid of the math!
• Students will be able to diagram, correctly apply, use, troubleshoot, and analyze data from a variety of spectroscopic and chromatographic instrumentation. Instruments are super cool! Let’s learn how they work!

Course Policies:
In addition to the policies outlined below, a social contract will be negotiated between students and instructor on the first day of class and posted on the website. Continued attendance indicates that you agree to abide by all course policies.
Classroom Behavior and Collaboration - CHEM 212 is part of a professional training program and students are expected to conduct themselves accordingly. Disrespect of the classroom learning environment, instructors, and fellow students will not be tolerated! Collaboration and working in small groups is a key component of classroom and lab time. Your group is there to support your learning, not do the work for you.

Late work and makeup labs- Late work is not accepted. This is in an effort to keep us all moving though the material efficiently. Furthermore, makeup labs will only be allowed in the case of University excused absences.

Attendance and Tardiness- Students are expected to attend class and not compromise the experience of other students.

Honor code and Academic integrity- Students are expected to conduct themselves in accordance with the UAF Honor code. The Chemistry Department policy states: Any student caught cheating will be assigned a course grade of F. The students academic advisor will be notified of this failing grade and the student will not be allowed to drop the course.

Disability Services- I will work with the Office of Disabilities Services (208 Whitaker Bldg, 474-5655) to provide reasonable accommodation to students with disabilities. It is the student’s responsibility to make an appointment with me to discuss appropriate accommodations. A letter from disabilities services must be provided.

Course Evaluation:
Grades are assigned on the typical scale 90-100 A, 80-90 B, 70-80 C, etc.

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<tbody>
<tr>
<td>Hour exams</td>
<td>5 x 100 pts (your 4 highest grades count)</td>
<td>400</td>
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<tr>
<td>Labs</td>
<td>7 x 40 pts; 1x 20 pts</td>
<td>300</td>
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<tr>
<td>Homework, quizzes &amp; in-class work</td>
<td>~25 x 10 pts normalized to 200 pts</td>
<td>200</td>
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<td>Creative projects</td>
<td>2 x 50 points</td>
<td>100</td>
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<td>Total points</td>
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<td>1000</td>
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Exams- Four hourly exams and the final are scheduled; I will average the four highest scores. The final exam is cumulative.

Labs- Eight labs will be performed during the semester. The first seven will be worth up to 40 points, preparation for the last lab will be worth 20 pts (no writeup required). See attached sheet for lab information and schedule.

Homework- Students are expected to watch online lectures BEFORE class, take notes, and doing associated problems. These will be turned in at the beginning of each class.
In class work- The bulk of class time will be used for individual and group work. Arriving to class prepared and *ACTIVE* participation is required! Work will be turned in and evaluated. **Bring your notes, a calculator, and a good attitude to class.**

Creative project- Two instructor approved creative projects (course units 1 and 2) are opportunities to demonstrate mastery of material by generating products (e.g., demonstrations, pencasts, and practice exams) to share with the class. Additional details available on website.

Course website:
The following materials are available on the course website:
- Tentative class schedule
- Materials for each day of class- videos, assignments, tutorials, items due, etc
- Tentative lab schedule
- Lab materials
- Grading rubrics
- Course syllabus

Tentative course schedule:
A more detailed schedule is maintained on the course website

**Unit 1: Data Treatment (Ch. 0-5)**
- Error and error propagation
- Statistical treatment of data
- Gravimetric analysis

**~10 days**

**Unit 2: Equilibrium (Ch. 6-11)**
- Solubility
- Acid-Base
- Chelation

**~11 days**

**Unit 3: Instrumentation 1 (Ch. 13-20)**
- Electrochemistry
- Spectrophotometry

**~9 days**

**Unit 4: Instrumentation 2 (Ch. 20-25)**
- Mass spectrometry
- Separations/ chromatography

**~7 days**
CHEM 212 Laboratory

Instructor: Amanda Barker
Contact info: ajbarker@alaska.edu
Availability: By appointment

Tentative Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Experiment</th>
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<tbody>
<tr>
<td>1</td>
<td>Analytical measurements</td>
</tr>
<tr>
<td>2</td>
<td>Ni cal curve</td>
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<tr>
<td>3</td>
<td>Ni st. add</td>
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<tr>
<td>4</td>
<td>Sorption of metals to iron oxides</td>
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<tr>
<td>5</td>
<td>Sorption of metals to iron oxides</td>
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<tr>
<td>6</td>
<td>Sorption of metals to iron oxides</td>
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<tr>
<td>7</td>
<td>Determination of FW by titration</td>
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<tr>
<td>8</td>
<td>Fe redox titration</td>
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<tr>
<td>9</td>
<td>Fe redox titration</td>
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<tr>
<td>10</td>
<td>UV-Vis</td>
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<tr>
<td>11</td>
<td>FT-IR</td>
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<tr>
<td>12</td>
<td>Caffeine by HPLC</td>
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<tr>
<td>13</td>
<td>Cocaine and currency</td>
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<tr>
<td>14</td>
<td>Wrap up</td>
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Lab Policies:
Safety- All students are expected to work within given safety guidelines and use common sense. Safety instructions will be given by the instructor or TA and must be followed.

Makeup labs- Makeups are not available in this course, except in instances of school-related travel. This is because there is only one lab section of this course and makeup labs require significant amounts of extra time for the TA and instructor.

Laboratory Evaluation: Lab write-ups are due the Monday after the exp. is completed.

Please visit course website for additional information, including: example lab write-ups, example grading rubrics, and other helpful materials.

Prelab (10/40 pts)- Students are required to prepare for each experiment before class. This includes, reading the lab, outlining the procedure in their lab notebook, and preparing data tables.

Accuracy and Precision of measurements (10/40 pts)- You are evaluated on the accuracy and precision of your experimental results in this course. Attention to detail and careful measurements are essential to success.

Lab write-ups (20/40 pts)- Students are evaluated on their writing skills as well as the analysis and interpretation of experimental results.