AUGUSTA UNIVERSITY

**Instrumental Analysis
CHEM 4840
Spring 2020**

INSTRUCTOR INFORMATION

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Course website: http://spots.augusta.edu/smyers1/Chemistry4840/chem4840welcome.html

COURSE OVERVIEW

Objective. To practice techniques of instrumental analysis including: use of instruments (emphasis on chromatography, spectroscopy and electrochemistry), data analysis, reporting and analysis of results and related professional skills.

Materials. *Quantitative Analysis* by Daniel Harris and materials necessary for lab. (i.e., notebook, labcoat, safety glasses). Note: Much of the material for this class will either be posted on the course website or sent by email. Students will be expected to check their email at least daily.

GRADING

Tests. There will be a midterm exam and a final exam. Each will be worth 150 points. The midterm will be Thursday February 20, in class. The Final will be at the regularly scheduled final exam time: Tuesday May 5 from 8 am to 10 am. For each exam, you will be permitted one 8.5 x 11 inch piece of paper on which you may handwrite whatever you like, calculator (any type), ruler and pencil. No other materials will be allowed and possession of such considering cheating. smart (or even moderately intelligent) watches are included in this prohibition.

Labs. Labs will be worth 20 – 50 points depending on difficulty. Instructions for conducting the lab and writing the reports will be distributed by email. These are sometimes complex so read carefully and ask questions if necessary. Students are responsible for following given instructions. All written reports must be word processed and meet professional guidelines (see website). Graphs and data analysis should be completed with a spreadsheet and must also meet professional guidelines as detailed in the "graphing in excel" link from the website. Ultimately, the style should following the *ACS Style Guide* (edited by J. Dodd) but a slightly more accessible version of a style guide can be found on the course website.

Other assignments. There will be other assignments. (The first 4 are already posted on the course website.) These will be given a point value at the time of the assignment.

Professionalism points. In addition to the regular assignment, many assignments will also have professionalism points available. (These are NOT extra credit). You get 3 points for turning in a neat, orderly and appropriate assignment and less if it is lacking in some area. (See website for rubric). There will also be "professionalism assignments" that include such things as writing a resume or professional meeting attendance. Students will be expected to accumulate 15 "meeting points" during the course of the semester but may accumulate as many as 30 points (anything over 15 is extra credit). As opportunities become available, students will informed by email with the point value of the opportunity and how to document their attendance.

Overall Grade. Students grade will be based on the percentage of points earn out of those available with 90% or greater earning an "A"; 89 – 80% earning a "B"; 79 – 70% earning a "C"; 69 – 60% earning a "D" and less than 60% earning a "F."

ATTENDANCE

Students are expected to attend all classes and all lab sessions. If you miss a class, it is your responsibility to find out what material was covered and what announcements were made.

You are expected to attend lab regularly and at the assigned time. You may lose points from your lab if you are late. If there is some reason you cannot be there at that time, you are expect to inform <u>both</u> the instructor and your lab partner as soon as possible. Since the location of the lab will vary, you are to report to the instructor's office at your assigned time for orientation. You must also report to the instructor when you leave lab. If you have permission to work outside of your assigned lab time, you must also report when starting and finishing. In other words, if you are working in lab, the instructor should be notified! If you are not present for lab, you have a zero for that experiment.

Absence from 4 lectures and/or lab is considered cause to drop a student from the course. Absence from two labs is cause to drop a student from the course. The instructor will only withdraw students after midterm (2/27) with the corresponding grade of WF.

GENERAL

Lab Notebooks. You are expected to keep a lab notebook that contains all information and data relevant to your lab. This should consist of a bound book (composition is ok) for writing down what you did as you do it and a binder for copies of computerized data (yes, your notebook can be a two volume item). Since the lab printers are not always reliable, the student should also have flash drive to store/move instrument data. Even if you did not collect all the data yourself, you are still expected to have all data pertaining to the lab in your notebook, giving credit to the person (your partner!) who did collect the data. **You will not be permitted in lab without your notebook**!

Makeups. If you are aware of an exam absence in advance, you must schedule a time to take the exam early. If unforeseen circumstances cause you to miss an exam, you must notify the instructor as soon as possible (normally the same day, perhaps even before the exam is over) and schedule a make-up as soon as possible. (Normally before the next class meeting.) If you are not taking the exam at the same time as the rest of the class it may be different and probably harder. Documentation of your excuse may be required and must be from an authority recognized by the instructor.

If you miss a lab, you must inform the instructor AND your lab partner as soon as possible. If you have an acceptable excuse and your lab partner agrees, the lab may be rescheduled. If not, you will be counted as absent and receive a zero for that lab.

Late penalties. There will be a 5 point per day late penalty. If an assignment does not meet prescribed standards (e.g., 0 professionalism points) it may be returned to the student and the late penalty will be 5 points for every day after it was returned.

Academic Honesty. While it is appropriate to discuss assignments with other students, students are expected to fully participate in in all classes and labs and submit only their own work for grading. Student should not have at their desk or on their person anything other than the material allowed for tests. Possession of cell phones or smart (or even moderately intelligent) watches is considered cheating. Failure to comply with these guidelines or any other detailed in the AU academic honesty policy will result in a zero on the assignment and possibly a WF for the course.

Safety. You are expected to abide by all department safety rules. Failure to do so will result in a zero for that experiment.

Note: The course instructor reserves the right to make changes to the course syllabus and schedule with reasonable notice to the students. The most up-to-date syllabus will be posted on the course website.

LEARNING OUTCOMES

1. Students will become proficient in the use of calibration curves, standard addition and internal standard calibration.
2. Students will become familiar with the theory and (primarily quantitative) use and capabilities of standard laboratory instrumentation, specifically: gas chromatography, liquid chromatography, molecular and elemental spectroscopy, absorption and emission spectroscopy, potentiometry and voltammetry.
3. Students will conduct basic experimental design.
4. Students will present and evaluate their laboratory results in both written and oral form.
5. Students will evaluate instrumentation to choose the proper instrument and calibration method for the problem.