Text: There is no required text for the course, but there will be required readings that will be made available by the instructor.

Lecture Overheads - Canvas: We will be using Canvas for the management of Chem 6770. Copies of many required readings and some lecture overheads will be posted on Canvas (https://online.usu.edu/).

Course Withdrawal: Refer to the current academic year registration calendar for details and deadlines concerning withdrawal conditions and deadlines.

Provisions: The administration of Chem 6770 will adhere strictly to the academic policies outlined in the most recent USU General Catalog, which can be found here: http://catalog.usu.edu/index.php. Students not enrolled in the course may sit in only with instructor approval.

Late assignments: Late assignments will not be accepted except under extenuating circumstances that will be considered on an individual basis. Missed quizzes cannot be made up unless the absence was approved by the instructor or resulted from an extenuating circumstance that will be considered on an individual basis.

Course Content: Chemistry 6770 is a graduate course and a part of the Biochemistry graduate core curriculum. It will cover the theory and practical approaches for an array of biochemical and biophysical techniques and is designed to provide you with a level of understanding sufficient to guide you in the acquisition and interpretation of appropriate data sets.

Course Assessment: Students in this class are expected to develop an understanding of the techniques and ideas covered in the course. Some will be covered in much greater depth than others and this will be reflected in the testing of the material. While the instructor will guide the course, the students will be responsible for adequately preparing for lecture as well as presenting a significant amount of the material to their peers. Attendance and participation are vital for this type of course and while attendance is not graded, participation is mandatory. A total of 25 points will be assigned based on participation in presentations and class discussions. Again, attendance is not mandatory, but you cannot participate if you are absent. It is the students’ responsibility to communicate with the instructor concerning their standing with regard to their participation points.
Quizzes will be administered throughout the course and will cover lecture material as well as any assigned reading and will often require the students to extend their understanding to related, but new, questions and scenarios. Quizzes will be worth a total of 50 points. Some quizzes will be announced ahead of time while others will not. This is why it is imperative to be prepared and attend class regularly. There will be several “hands on” laboratory sections and each will require a lab write-up at the end. The write-ups will be worth 75 points total and details concerning format will be discussed in class.

One final exam will be given at the end of the course and it may consist of both in class and take-home material. The final exam will be worth 50 points.

**Grading:**

Class Presentation/participation .........................................................25 points
Quizzes ..................................................................................................50 points
Lab reports ............................................................................................75 points
Final Exam ..............................................................................................50 points

**Total.......................................................................................................200 points**

In terms of final assignment of grades, you are guaranteed the following grades if your final class percentage lies within the indicated ranges.

100-90% A through A- 89.9-78% B+ though B-
77.9-68% C+ through C- 67.9-59% D+ through D-

Based on the overall class average at the END of the semester, the percentage cutoffs may be adjusted to be lower than those above at the instructor’s discretion. They will never, however, shift higher.

**OBJECTIVE**

In planning this course, I have identified three main course objectives:

1. **Gaining factual knowledge (terminology, classifications, methods, trends)**
2. **Learning fundamental principles, generalizations, or theories**
3. **Learning to apply course materials (to improve rational thinking, problem solving and decisions)**

**Students with disabilities statement:** USU welcomes students with disabilities. If you have, or suspect you may have, a physical, mental health, or learning disability that may require accommodations in this course, please contact the Disability Resource Center (DRC) as early in the semester as possible (University Inn # 101, 435-797-2444, drc@usu.edu). All disability related accommodations must be approved by the DRC. Once approved, the DRC will coordinate with faculty to provide accommodations.

**Plagiarism Policy:** Plagiarism includes knowingly "representing by paraphrase or direct quotation, the published or unpublished work of another person as one's own in any academic exercise or activity without full and clear acknowledgment. It also includes the unacknowledged use of materials prepared by another person or agency engaged in the selling of term papers or other academic materials." The penalties for plagiarism are severe. They include warning or reprimand, grade adjustment, probation, suspension, expulsion, withholding of transcripts, denial or revocation of degrees, and referral to psychological counseling.

**COVID-19 Classroom Safety Protocols:** While not mandated at the time that this syllabus was published, USU encourages and welcomes the wearing of masks in all university building, especially within 6 feet of others. Furthermore, it is strongly encouraged to take measures to mitigate risk as recommended by federal and state public health officials. These measures include getting fully vaccinated, staying home if you are sick (even with mild symptoms), and maintaining good hygiene including frequent hand washing. Testing will be provided, without charge, throughout the semester and the [USU COVID Webpage](http://www.usu.edu/covid) will provide up-to-date information. Please remember; COVID can have significant impact on the health and safety of those around you so remain vigilant and respectful.
Tentative Class Topics

Detection and quantification of proteins and/or nucleic acids
- SDS PAGE
- Native PAGE
- 1D vs. 2D
- Protein Blots (discuss types)
- UV-Vis/Extinction Coefficient (Beer’s Law)
- Colorimetric assays
- Agarose Gel Electrophoresis
- Tags (i.e. fluorescent labels and “click” chemistry)

How do I characterize my protein?
- Stability – (Russ Middaugh Paper)
- Gel Filtration
- Mass Spectrometry
- Structure (i.e. CD, X-Ray, NMR)
- Sequencing

How do I know two proteins interact/measure how well they interact?
- Pull-down/immunoprecipitation
- FRET
- Yeast 2-hybrid
- ITC (isothermal titration calorimetry)
- SPR (Surface Plasmon Resonance)
- Static/Dynamic Light Scattering
- Anisotropy
- Chemical crosslinking
- Analytical ultracentrifugation

Microscopy
- Light microscopy
  - Principles (Numerical aperture, Diffraction limit)
- Fluorescence microscopy
  - Principles (Jablonski Diagrams)
- Electron Microscopy
- Scanning techniques
- Novel methodologies