please note that this syllabus may be edited up to the first day of classes

Syllabus for CHEM 6285, Fall Semester, [redacted]

[redacted]

Lecture: MWF: 11-12 (MoSE 1201A)

Office Hours: By Appointment

Email: [redacted]

*****READ THIS SECTION CAREFULLY SO YOU DON'T WASTE YOUR $$*****

Required Texts

NONE

The vast majority of this course will deal with literature articles that will be provided for download from the course website. Interspersed in the semester will be fundamental lectures covering key background topics. These lectures will largely be taken from the…

Optional Texts

Light and Matter by Yehuda B. Band

Modern Spectroscopy by J. Michael Hollas

Symmetry and Spectroscopy by D. C. Harris and M. D. Bertolucci
This is a very nice, **inexpensive** introduction to fundamental spectroscopic principles.

Building Scientific Apparatus, 3rd edition by J. H. Moore, C. C. Davis, and M. A. Coplan
If you are going to be doing any instrument building/fixing/tinkering, you **NEED** this book.

I estimate that my lectures will cover no more than 10% of any of the first three books.

Objective

The goal of this course is to provide a practical understanding of how molecular spectroscopies are used to characterize complex chemical systems. This course IS NOT meant to be a comprehensive review of ALL spectroscopic methods. Instead, it is meant to provide you with practical knowledge towards real-world understanding and application of spectroscopic tools and the chemistries they elucidate. Lecture materials will come from the recommended reading (handouts/downloads) and recent and historically relevant journal articles.

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Grading

Grades will be based on:

- Two (2) non-cumulative, in-semester exams, each accounting for 20% of your final grade
- Miscellaneous homework assignments (10% of final grade)
- A cumulative final exam (20% of final grade)
- A written proposal + proposal reviews (30% of final grade)

Final grades will be given based on the following scale:
A (100 - 85%); B (84 - 70%); C (69 - 60%); D (59 - 50%); F (below 50%).

Course Topics

Spectroscopies:

Absorbance (steady state, transient)
Fluorescence (steady state, transient, polarization anisotropy, FRET)
Light scattering (static, dynamic, Raman, resonance Raman, SERS)
Plasmonics (SPR, LSPR - perhaps presented after SERS)

Applications:

Biophysics
Chemical sensing
Systems biology
Polymer assembly
The "protein corona"
Bioassays
Cell biology
Bioimaging
Drug delivery

Exam Schedule

Exam #1: Friday, September 30th
Exam #2: Friday, November 4th
Final Exam: Monday, December 12th, 8-10:50am

Readings

Papers will be posted to t-square with new papers being posted throughout the semester, depending on what direction the course takes. Approximate discussion dates will be included. Please come to class prepared to discuss the literature. Please read *CRITICALLY* – try to find questionable points of interpretation, analyses, etc.

Literature Journal

Everyone in class is required to maintain a Journal, in which they will make notes on the papers they read outside of class. A Literature Journal is a good way to help you remember what is important about what you have read, as opposed to just making marginal notes on the paper itself. Some things that could be entered into the Journal:

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- *Key points of the paper*
- *Questionable parts* – perhaps a conclusion/interpretation/method that you question the accuracy of and want to go check later.
- *Idea log* – does the paper give you some ideas for research directions or proposal topics?
- *Further reading* – are there citations in the paper that you need to go get to read later?
- *Research connections* – does one paper you read have a profound scientific connection to another?

Written Research Proposal/Proposal Reviews

Each student will write an original research proposal in the format specified in class. The topic of the proposal can be ANYTHING chemistry related, but specific spectroscopic tools MUST be a major focus of the work. Also, your proposal CANNOT BE RELATED TO RESEARCH YOU HAVE DONE PREVIOUSLY OR ARE CURRENTLY PERFORMING. The proposal instructions for this grant application will be available for download from the course website (see t-square: https://t-square.gatech.edu/portal).

******Important Note******

This website is password protected for copyright purposes. Do not share information posted to this webpage with anyone outside the class.

Proposals/Reviews

Proposals Due: Monday, November 14th
Proposal Reviews Due: Wednesday, November 23rd
Study Section Review: Monday, November 28th – Friday, December 9th

Proposal Review Criteria

You will assign scores to proposals based on the criteria listed in the **critique template** and discussed in the **reviewer guidelines** document. Each criterion should be addressed individually in the review. Bulleted lists of comments ***are*** permitted. It is up to each individual reviewer to determine the relative weight given to each criterion. A proposal could be scored quite highly if it is deficient in one area but outstanding in another. The major headings in your review are shown in the **critique template** posted on t-square.

Proposal Review Procedure

Your peers in an NIH Study Section format will review the proposals. After you submit the proposals, they will be distributed so that each of you have a copy of every other proposal submitted. Each of you will have your proposal reviewed by three individuals, who will remain anonymous to you. Thus, each student will be responsible for reviewing 3 proposals each. Standard NIH review criteria (posted) will be used. Your reviews are due prior to the review meeting, thus allowing me to have all of the reviews prior to discussion. During the review sessions, when a proposal is to be discussed, that

student (the proposer) will be asked to leave the room so that the proposal can be discussed openly. The discussion will begin with each reviewer giving his numerical score. Then Reviewer 1 will give a short introduction to the proposal, followed by a synopsis of his/her review. Reviewer 2 and the Discussant will then give their review synopses. The Discussant will be expected to provide more of a big-picture analysis as opposed to a detailed technical analysis. The proposal then will be open for general panel discussion, after which we will revisit the Reviewers' scores. Everyone on the panel will then provide a score, which I will record.

It will be important to maintain reviewer confidentiality. Do not tell your classmates who reviewed their proposal, as this is a breach of confidence. If I discover that this information is being shared amongst classmates, it will be considered a breach of the honor code. The need for confidentiality is also discussed in the **reviewer guideline**s document.

The Honor Code and Plagiarism

The Georgia Tech Honor Code is available on line. All students are expected to adhere to this Code; violations will be dealt with through the Dean of Students. Furthermore, plagiarism will not be tolerated in this class. Plagiarizing is defined by Webster's as "to steal and pass off (the ideas or words of another) as one's own: use (another's production) without crediting the source." If caught plagiarizing, you will be dealt with according to the GT Academic Honor Code.

Some helpful guidelines: (1) Quote and attribute any words that are not your own. (2) Do not cut and paste ANYTHING into your papers. (3) Do not use "word." (With "word" being any material a student may have acquired from a previous semester of your class.