

Senior Research (CHEMISTRY LABORATORY IVA-CTW)

Dr. Ray

Chemistry 4160 (CRN 12822)

Spring 2019

Prerequisites:	Chem 4000, 4110 or 4330, and Chem 4600 with grades of C or higher, or equivalent
Instructor:	Dr. Gigi B. Ray, 212 Courtland North, gbray@gsu.edu, Tel. (404) 413-5540 Kelsey Jordan, Science Librarian, kjordan44@gsu.edu, Library South, Suite 542 Kimberley Bartlett, TA kbartlett4@student.gsu.edu
Class:	Mondays 9:00am – 11:45am, 311 Petit Science Center (3-credit hour course) Meet individually with instructor or TA, weekly to discuss writing/presentations.
Office Hours:	Mondays and Wednesdays 1:00 – 2:00pm, and Fridays 2:30 – 3:30pm Individual appointments: Wed 10am-12pm, Thurs 1:00- 4:00pm, Fri 2:30- 3:30pm
Text:	Class notes and handouts will be posted on iCollege: <u>CHEMISTRY LABORATORY IVA-CTW SECTION 099 SPRING SEMESTER 2019</u>
Course Objectives:	<p>Chemistry Laboratory IVA. Concurrent enrollment in Chem 4160 and 4170 is not allowed.</p> <p><i>Signature Experience: Independent research on a special topic related to chemistry. Capstone project that integrates different aspects of chemistry: biological, organic, physical, computational, and analytical.</i></p> <p>Individual projects involve exploring a topic in depth, learning and doing research using a variety of sources, and demonstrating mastery and understanding of the material by communicating this knowledge in both written and oral form.</p> <p>Develop research skills by becoming proficient in the use of science databases: SciFinder Scholar, Web of Science, Reaxys, Medline (Pub Med), and the EndNote reference management system.</p> <p>Develop practical skills by becoming proficient in the use of ChemBioDraw Ultra software to represent chemical reactions and mechanisms. Analyze NMR spectra and literature synthesis routes to compound in research project.</p> <p>Develop computational skills by learning to use the Accelrys Visualizer program for 3D-protein structure analysis, and explore structures in the Protein Data Bank (PDB).</p> <p>Develop critical thinking and writing skills (CTW), by writing and revising reports on semester-long research project. Have regular, individual meetings with research advisor to improve understanding, writing and presentation skills. Final Chem 4160 Report is submitted to Chemistry Department.</p> <p>Develop presentation skills by giving two oral presentations (using PowerPoint), and a poster presentation on the research project. Attend research seminars to observe the presentation style of others, and to learn about new areas of science.</p> <p>Molecular Modeling component: use Accelrys Visualizer to probe biomolecular interactions and do structure-function analysis of proteins.</p> <p>Careers component: explore potential career paths, internships and training opportunities, and develop job searching skills by writing resumes and cover letters.</p>

Class Policies and Assignments:	<p>1) Students will select a research topic of interest to them (from list), write two short reports, do a one short oral presentation (15 mins) using PowerPoint, and present a poster on <i>several distinct aspects</i> of their topic/theme. Students will also present a cumulative 30min Oral Presentation (<i>three subtopics</i>), and submit a final 8-12 page Chem4160 Report in ACS Journal style.</p> <p>2) Students are required to schedule 20-min appointments with instructor or TA, every week outside of class to discuss paper / presentation content & organization, and how to improve written work & oral presentations (minimum 8 meetings).</p> <p>3) Students are required to complete the Responsible Conduct of Research online <u>Physical Science module (CITI)</u>, and submit completion report. At http://www.citiprogram.org complete the Basic and Physical Science courses.</p> <p>4) Students are required to attend 3 seminars/events outside of class, during the semester (one from each category): Science seminar (1), Science conference (1), Career fair or Career seminar (1). Submit half page synopsis of each seminar (describe content and style).</p> <p>5) Attendance, timely arrival and participation in <u>all</u> class meetings required. If absent, it is the student's responsibility to makeup missed work. Students must pay attention to speaker (instructor, guest speaker, or classmate), <i>do not browse the internet or do other work during class.</i></p> <p>6) Assignment submission: Some assignments will require <u>hardcopy printouts</u> to be turned in during class, while others will require uploading documents to an assignment folder in iCollege. Points will be deducted for late submissions. Assignments will only be accepted up to one week past the due date.</p> <p>7) Cell phones, iPhones, iPods, blue tooth, tablets, and other electronic devices must be OFF during all classes. Laptops are allowed to do classwork.</p> <p>8) Tuesday March 5th is last day to withdraw from the class and receive "W". You are responsible for withdrawing before the deadline if you need to do so. The University requires that faculty members must, on a date after the mid-point of the course to be set by the Provost (or his designee): 1. Give a WF to all those students who are on their rolls but no longer taking the class 2. Report the last day the student attended or turned in an assignment.</p>
Grading:	<p style="text-align: center;">Total points: 200 (see grading rubric)</p> <p>25 points each: Final Semester Report #3*, Final Oral Presentation,</p> <p>20 points: Molecular Modeling Project Report</p> <p>20 points: PowerPoint slides #1 to #4 collectively (4,4,4,8pts)</p> <p>10 points each: Report #1*, Report #2, Poster, 1st Oral Presentation</p> <p>6 points: Seminar Summaries collectively (2pts each x 3)</p> <p>5 points each: Responsible Conduct in Research (CITI) #1, SciFinder Scholar Database #2, Semester project Outline/Abstract #3, SciFinder Reactions #4, ChemBioDraw #5, Cover Letter & Job Adds #6, Resume #7, NMR Spectra #8, Personal Statement #9</p> <p>15 points: Class attendance and participation</p> <p><i>*Final grade for Report 1 and 3 will be an average of original and revised grade</i></p>
Grading Scale:	<p>A+ 97% A 90% A- 87% B+ 84% B 80% B- 76% C+ 71% C 65% C- 59% D 50% F <50%</p>

TENTATIVE CHEM 4160 CLASS SCHEDULE (Subject to change) Spring 2019

Date	Day	Topics	Meeting
Jan 14	M	Introduction to Course Search Scientific Literature – SciFinder Scholar and Web of Science Reading Science Articles → Select Chemistry Research Project Topic (related to current issues)	1
Jan 21	M	Martin Luther King Holiday, no class → submit detailed topic/title for the entire semester project (<i>iCollege Dropbox</i>)	
Jan 22-25	T-F	• meet with Dr. Ray to finalize semester topic (outside class appointment)	
Jan 28	M	Reactions Synthesis Search using Structures in SciFinder Scholar Writing in the Sciences, Citations and Avoiding Plagiarism → submit Hwk #1 – Responsible Conduct of Research (CITI) Report → submit Hwk #2 –SciFinder Scholar Literature Search on Student's topic → submit 2 review articles on semester topic	2
Jan 29-31	T-R	• meet with Librarian to finalize literature search (outside class appointment)	
Feb 4	M	Drawing Structures & Reaction Mechanisms using ChemBioDraw → submit PowerPoint Slides #1 (6 – 8 slides) on Introduction & Background → submit Hwk #3 – Abstract (half page) and detailed Outline (1 page) of entire semester's Research Project (System Background, Synthesis, NMR, and Mechanism of Action) → submit Hwk #4 – SciFinder Scholar Reactions Search → submit 1 st synopsis of seminar attended in January	3
Feb 11	M	Careers in Chemistry: Job Searches, Resumes, and Cover Letters Preparing Oral Presentations & PowerPoint Slides → submit Report #1 (4 – 5 pages text plus figures) on Introduction to entire semester project (system) with details on specific enzyme/process affected by drug/small molecule	4
Feb 18	M	NMR Spectra Search and Interpretation Writing Personal Statements – Victoria Mariani → submit PowerPoint #2 (12 – 14 slides) on Revised Introduction, and Full Synthesis (indicate reaction types) and show Reaction Mechanisms, (includes Hwk #5 – ChemBioDraw Figures of Synthesis & Mechanism) → submit Hwk #6 – Cover Letter (reply to one specific job ad) and 3 Job Advertisements for related positions, with different educational qualifications (BS, MS, PhD or Professional Degree)	5
Feb 22	F	→ submit Hwk #7 – Technical Resume (by 12 noon on Friday via <i>iCollege</i>)	
Feb 25	M	1st Oral Presentations – Introduction to System & Compound, Synthesis & Reaction Mechanisms (20 min each, 6 students)	6
Feb 29	F	→ submit Revised Report #1 (Introduction with Figures & References)	
Mar 4	M	Reference and Database Management using EndNote Creating 3' x 4' Poster by Combining PowerPoint Slides → submit PowerPoint #3 (16 – 18 slides) on Introduction, Synthesis, Mechanisms, and NMR Spectra analysis (includes Hwk # 8 NMR) → submit Personal Statement assignment #9 (<i>iCollege</i>) → submit 2 nd synopsis of seminar attended in February (<i>iCollege</i>)	7
Mar 5	T	Last day to Withdraw and possibly receive a W	

Date	Day	Topics	Meeting
Mar 11	M	Accelrys Visualizer Molecular Modeling Activity #1 – Tripeptide Mechanism of Action of Drug / Small Molecule → submit Report #2 (7 – 9 pages text plus key figures which clarify text) on Introduction, focus on Explanation of Synthesis (reaction types) and Mechanisms, NMR Spectra Analysis , with Refs properly formatted in ACS Style	8
Mar 13	W	→ submit Poster draft (12 PPT slides) on Entire semester project with Background, Synthesis, and focus on Mechanism of Action	
Mar 18-22	M-F	Spring Break, no class	
Mar 25	M	Accelrys Visualizer Molecular Modeling Activity #2: Protein Active Site Structure Analysis → submit Poster (3' x 4' format, ready to print) on Entire semester project → submit final Resume and Cover Letter revisions → submit Hwk #9 – Molecular Modeling Tripeptide Preliminary Exercise	9
Mar 29	F	Present Research Poster at Undergraduate STEM Research Conference 1 – 4 pm (required)	
Apr 1	M	Accelrys Visualizer Molecular Modeling Activity #3: → submit Hwk #10 - Molecular Modeling Data Table, Active Site Drawings, and Group Computer Files → submit PowerPoint #4 (22 – 26 slides) all revised slides with focus on Mechanism of Action: explanation of how drug/process affects system	10
Apr 5	F	→ submit Hwk #11 – Molecular Modeling Project Written Report	
Apr 8	M	Accelrys Visualizer Molecular Modeling Activity #4 3D Protein Structure Analysis and Identification → submit completed Molecular Modeling Project Report → submit 3 rd synopsis of seminar attended in March	11
Apr 10	W	Attend GSURC	
Apr 15	M	Create Protein Structure Figure for Student's Project → submit Final Report #3 (11 – 14 pages text plus Figures & References) on Introduction, Synthesis/Mechanism, NMR Spectra Analysis, Experimental Data Analysis, Protein Structure Analysis, with focus on Mechanism of Action: detailed explanation of how drug or molecule binds, and perturbs the system with References properly formatted (ACS style) using EndNote linked to Word (<i>iCollege dropbox and Turnitin originality checker</i>) → submit Protein Data Bank Structure Article with PDB filename	12
Apr 22	M	Final (2nd) Student Oral Presentations (30 min each, 4 students) → submit Revised Final PowerPoint #4 (22 – 26 slides) on Entire semester project, including protein structure analysis)	13
Apr 29	M	Final (2nd) Student Oral Presentations (30 min each, 2 students) Semester Wrap Up → Submit Revised Final 4160 Report (Hardcopy printout and Electronic copy in iCollege dropbox), in lieu of Final Exam	14

Color Key in Schedule:

Blue = Research Project Reports, PowerPoints, and Presentations

Green = Molecular Modeling Project; Black = Skills Assignments

Spring 2019 Events:

- **Tuesday Mar 5** – Internship & Co-Op Fair (11am - 3pm) Student Center, career.gsu.edu
- **Saturday Mar 23** – Atlanta Science Festival, atlantasciencefestival.org
- **Friday Mar 29** – Undergraduate STEM Research Conference (1 - 4pm) NSC 5th Floor, cas.gsu.edu/stem
- **Saturday Apr 13** – Southeast Enzyme Conference (all day) at GSU, sec.gsu.edu
- **Wednesday Apr 10** – Georgia State Undergraduate Research Conference, (9am-3:30pm) Student Center
gsurc.honors.gsu.edu

Websites:

- GSU STEM Resources: <http://cas.gsu.edu/stem/>
- Chemistry Department webpage: <http://chemistry.gsu.edu/undergraduate/>
- Chemistry Seminars: <https://chemistry.gsu.edu/spring-2019-seminars/>
- Library Resources: <http://research.library.gsu.edu/chemistry>
- Honors Resources: <http://honors.gsu.edu/research/>
- GSU Career Services: <http://career.gsu.edu/>
- Chemistry & Engineering News: <http://cen.acs.org/index.html>
- American Chemical Society: <https://www.acs.org/content/acs/en/careers.html>