

# Senior Research (CHEMISTRY LABORATORY IVA-CTW)

Dr. Ray

## Chemistry 4160 (CRN 54648)

### Summer 2018

Prerequisites:	Chem 4000, 4110 or 4330, and Chem 4600 with grades of C or higher, or equivalent
Instructor:	<b>Dr. Gigi B. Ray, 212 Courtland North, <a href="mailto:gbray@gsu.edu">gbray@gsu.edu</a>, Tel. (404) 413-5540</b> <b>Kelsey Jordan, Science Librarian, <a href="mailto:kjordan44@gsu.edu">kjordan44@gsu.edu</a>, Library South, Suite 542</b> <b>Kimberley Bartlett, TA</b>
Class:	<b>Tuesdays &amp; Thursdays 3:00pm – 5:45pm, 311 Petit Science Center (3-credit hours)</b> <b>Meet individually with instructor or TA, weekly to discuss writing/presentations.</b>
Office Hours:	<b>Tuesdays and Thursdays 1:30 – 2:30pm &amp; 6 – 7pm; Fridays 11am – 1pm</b>
Text:	Class notes and handouts will be posted on iCollege: <b><u>CHEMISTRY LABORATORY IVA-CTW SECTION 099 SPRING SEMESTER 2018</u></b>
Course Objectives:	<p>Chemistry Laboratory IVA. Concurrent enrollment in Chem 4160 and 4170 is not allowed.</p> <p><b><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></b></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><b>1) Students will select a research topic of interest to them (from list), write two short reports, do 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>minimum three subtopics</i>), and submit a Final Chem4160 Report in ACS Journal style (10 – 12 page text, plus figures, and ACS style references)</b></p> <p><b>2) Students are required to schedule 20-min appointments with instructor or TA, every week outside of class to discuss paper / presentation content &amp; organization, and how to improve written work &amp; oral presentations (minimum 7 meetings).</b></p> <p><b>3) Students are required to complete the Responsible Conduct of Research (CITI) online <a href="#">Physical Science module</a> and submit completion report.</b> At <a href="http://www.citiprogram.org">http://www.citiprogram.org</a> complete the Basic and Physical Science courses.</p> <p><b>4) Attendance, timely arrival and participation in <u>all</u> class meetings required.</b> 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, play on your phone, or do other work during class.</i></p> <p><b>5) Assignment submission:</b> Many assignments will require <i>hardcopy printouts</i> to be turned in during class, while others will require uploading documents to the assignment folder in iCollege, or both. <b>Points will be deducted for late submissions. Assignments will only be accepted up to 2 days past the due date. All late submissions must be submitted as a printout to Dr. Ray.</b></p> <p><b>6) Cell phones, iPhones, iPods, blue tooth, tablets, and other electronic devices must be OFF and put away in bag during all classes. Laptops are allowed only for doing classwork.</b></p> <p><b>7) Friday June 29<sup>th</sup> is last day to withdraw from the class and receive "W".</b> 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;"><b><u>Total points: 200</u></b></p> <p><b>25 points each:</b> Final Chem 4160 Semester Report*, Final Oral Presentation</p> <p><b>20 points:</b> Molecular Modeling Project Report #11, Tripeptide #9, Table, Drawings and Group Computer Files #10</p> <p><b>20 points:</b> PowerPoint slides #1 to #4 collectively (4,4,4,8pts)</p> <p><b>10 points:</b> Responsible Conduct in Research (CITI) #1</p> <p><b>10 points each:</b> Report #1*, Report #2, Poster, 1<sup>st</sup> Oral Presentation</p> <p><b>5 points each:</b> SciFinder Database Searches #2, Semester project Outline &amp; Abstract #3, SciFinder Reactions #4, ChemBioDraw #5, Resume #6, NMR Spectrum #7, Cover Letter &amp; Job Adds #8, Personal Statement #12</p> <p><b>20 points:</b> 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><b>A+ 97%   A 90%   A- 87%   B+ 84%   B 80%   B- 76%   C+ 71%   C 65%</b> <b>C- 59%   D 50%   F &lt;50%</b></p>

Date	Day	Topics	Meeting
Jun 5	T	<b>Introduction to Course</b> <b>Databases: Search Science Literature using SciFinder Scholar, Web of Science, PubChem</b> <b>Reading Science Articles</b> → <b>Select Chemistry Research Project Topic</b> (related to current issues)	1
Jun 5-8	T-F	→ meet Dr. Ray to finalize semester topic (outside class appointment)	
Jun 7	R	<b>Reaction Synthesis Search using Structures in SciFinder Scholar</b> <b>Writing in the Sciences &amp; Avoiding Plagiarism</b> → submit Hwk #1 – Responsible Conduct of Research Report (CITI) Report → submit Hwk #2 – SciFinder Scholar Literature Search on student topics	2
Jun 6-11	W-M	→ meet with Librarian about literature search (outside class appointment)	
Jun 12	T	<b>Drawing Structures &amp; Reaction Mechanisms using ChemBioDraw</b> <b>References and Citations using ACS Style</b> → submit <b>PowerPoint Slides #1</b> (6 – 8 slides) on Introduction & Background → submit Hwk #3 – <b>Abstract</b> (half page) and detailed <b>Outline</b> (1 page) of <b>entire</b> semester's Research Project (System Background, Synthesis, NMR, Mechanism of Action) → submit <b>2 review articles</b> on semester topic → submit Hwk #4 – SciFinder Scholar Reactions Search	3
Jun 14	R	<b>Careers in Chemistry: Job Searches, Resumes, and Cover Letters</b> <b>Preparing Oral Presentations &amp; PowerPoint Slides</b> → submit <b>Report #1</b> (3 – 5 pages text plus figures) on <b>Introduction</b> to <b>entire</b> semester Project (system) with details on enzyme/process affected by drug/small molecule	4
Jun 19	T	<b>NMR Spectra Search and Interpretation</b> <b>Writing Personal Statements</b> → submit <b>PowerPoint #2</b> (10 – 14 slides) on Revised Introduction, and <b>Full Synthesis (indicate reaction types)</b> and Reaction Mechanisms → submit Hwk #5 – ChemBioDraw (Synthesis & Mechanism) → submit Hwk #6 – Technical Resume	5
Jun 21	R	<b>1<sup>st</sup> Oral Presentations – Introduction to System &amp; Compound and Synthesis &amp; Reaction Mechanisms (20 min each, 6 students)</b> → submit <b>Revised Report #1</b> (Introduction with Figures & References) if not giving oral presentation → submit Hwk #7 – NMR Spectra (with peaks assigned & labeled)	6
Jun 26	T	<b>1<sup>st</sup> Oral Presentations – Introduction to System &amp; Compound and Synthesis &amp; Reaction Mechanisms (20 min each, 6 students)</b> → submit <b>PowerPoint #3</b> (16 – 20 slides) on Introduction, Synthesis, Mechanism, and NMR Spectra analysis	7
Jun 28	R	<b>Accelrys Visualizer Molecular Modeling Activity #1 – Tripeptide Mechanism of Action of Drug / Small Molecule</b> → submit <b>Report #2</b> (7 – 9 pages text plus key figures which clarify text) on Introduction, <b>focus on Explanation of Synthesis (reaction types) and Mechanisms, NMR Spectra Analysis, and ACS Style References</b>	8
Jun 29	F	<b>Last day to Withdraw and possibly receive a W</b>	

Date	Day	Topics	Meeting
Jul 3	T	<b>Accelyrs Visualizer Molecular Modeling Activity #2 – Protein Active Site Structure Analysis</b> → submit <b>PowerPoint #4</b> (22 – 26 slides) all revised slides with focus on <b>Mechanism of Action</b> : explanation of how drug/process affects system → submit Hwk #8 – 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) → submit Hwk #9 – Molecular Modeling Tripeptide Preliminary Exercise	9
Jul 5	R	<b>Accelyrs Visualizer Modeling Activity #3 – Protein 3D Structure / Function Analysis and Identification</b> → submit <b>Poster</b> (12 PPT slides) on Entire semester project with Background, Synthesis, and <b>focus on Mechanism of Action</b> → submit Hwk #10 - <b>Molecular Modeling Data Table, Active Site Drawings, and Group Computer Files</b>	10
Jul 6	F	→ submit Hwk #11 – <b>Molecular Modeling Project Written Report</b>	
Jul 10	T	<b>Accelyrs Visualizer Activity #4 – Protein Data Bank Structures</b> → submit <b>Poster (3' x 4' format, ready to print)</b> on Entire semester project → submit Hwk #12 – Personal Statement	11
Jul 12	R	<b>EndNote: Reference and Database Management</b> → submit <b>Final Report #3</b> (11 – 14 pages text plus Figures & References) on Introduction, Synthesis/Mechanism, NMR Spectra Analysis, Experimental Data Analysis, Protein Structure Analysis, with focus on <b>Mechanism of Action</b> : detailed explanation of how drug or molecule binds, and perturbs the system → submit Hwk #13 – Protein Data Bank Structure Article with PDB filename	12
Jul 13	F	→ <b>Present Poster Presentation at Undergraduate STEM Research Conference (required)</b>	
Jul 17	T	<b>Final (2<sup>nd</sup>) Student Oral Presentations (30 min each, 6 students)</b> → submit <b>Revised Final PowerPoint #4</b> (22 – 26 slides) on Entire semester project, including protein structure analysis)	13
Jul 19	R	<b>Final (2<sup>nd</sup>) Student Oral Presentations (30 min each, 6 students)</b> → submit Revised Technical Resume, Cover Letter, Personal Statement	14
Jul 24	T	<b>→ submit Revised Final 4160 Report by 3pm (hardcopy printout and electronic copy in iCollege / Turnitin), in lieu of Final Exam</b> <i>*last day to submit all course materials</i>	15

**Color Key in Schedule:**

**Blue = Class Activity**

**Red = Research Reports, Oral Presentations, Poster, PowerPoints**

**Green = Molecular Modeling Project**

**Black = Skills Assignments**