

CHEM 3150 (CRN 30828)
Advanced Inorganic Chemistry Laboratory
Spring – 2020

Lab Only Course: T 2:40 – 5:30 pm (Laney-Manion 302)

Instructor: Dr. Marsha D. Massey

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Office Hours: by appointment sign-up online here:

<https://tinyurl.com/MeetingMasseySpring2020>

Materials Required:

- Laboratory notebook
- Text: “Inorganic Chemistry” by Weller, Overton, Rourke, Armstrong. 7th ed. ISBN: 978-0198768128
- Google Classroom (for lab manuals, assignments, etc)*
- Blackboard (will use to keep track of grades)
- Internet-capable device: laptop, cellphone, or tablet (for during class)*
- Calculator

*The university and its affiliates are not responsible for any damage to your technology (ex: laptops, tablets, cellphones) used in lab or class.

Course Description	Application of inorganic chemistry concepts in the laboratory. The course will include laboratory work in groups. Students enrolled in this laboratory course are required to be enrolled in Advanced Inorganic Chemistry, CHEM 4380. Although Intermediate Inorganic Chemistry (CHEM 3360) is not a pre-requisite, you may find its content helpful preparation for this course.
Prerequisite	Students must have taken and passed CHEM 3411 and CHEM 3520 with a C or better. Students must have a <u>strong</u> ability to apply content from prior chemistry courses to succeed.
Course Objectives	Students will be able to apply inorganic chemistry concepts to laboratory work. Students will become confident in evaluating and discussing chemical structure, chemical reactivity, and spectroscopic properties of compounds containing transition metals.
Office Hours	Take advantage of office hours early in the semester. Come to see me the moment you are concerned about understanding course material. This time is most effective if you come prepared with specific questions. If the times shown do not work for your schedule, email me for an appointment.

Recommended Additional Texts:

“Inorganic Chemistry” by Shriver & Atkins. 4th ed.

“Descriptive Inorganic Chemistry” by Rayner-Canham & Overton. 5th ed.

Although not required these texts may be helpful to develop understanding of concepts in the course.

Overall Course Grade:

Assignment	Total Assigned	Number Counted	Percent
First Day Practice	1	all	5
Technique	13	12	10
Lab Notebook Evals	13	12	10
Lab Summaries	5	5	25
Major Lab Reports	6	5	50
Total			100

A: 100 – 89 **B:** 89 – 79 **C:** 79 – 69 **D:** 69 – 59 **F:** <59

Course Policies:

Attendance for this course is mandatory. You are permitted one (1) laboratory absence. In the case of illness, have your medical provider send a note the day you return to class.

No make up labs will be offered. Because labs extend over multiple weeks you should work with your group to keep on top of progress. However you can only miss one (1) lab session this term without negatively impacting your grade. Missing more than one (1) lab can result in a grade of zero for the other labs' major/minor report.

Three unexcused absences will result in a course grade of W.

Late assignments will receive 50% credit of the assigned grade, if turned in no later than two (2) days late. Assignments turned in later than two days (48 hours) after deadline can be submitted for evaluation but will receive a grade of zero (0).

Assignment extensions *may* be granted in the case of unavoidable circumstances (medical or family emergencies). If so, and you do not adhere to the new deadline zero points will be given for the assignment.

Regrade Policy: You have one (1) week after assignments are returned **to the class** to request grade adjustments.

Classroom Etiquette: You are expected to be *engaged* and respectful of everyone's time in lab. You will work in groups to complete laboratory work which will require you come prepared to lab each week. You will lose points for participation if you come to lab ill prepared and/or if you fail to participate effectively with the group experiment.

E-mail Policy: I will reply to your email promptly as possible. Please keep in mind like yourselves I have a schedule full of classes, meetings, and additional life matters to address daily. Thus, please allow for **24 hours** after your e-mail has been sent for me to send a reply. Holidays and weekends I may require more time, but I will endeavor to reply that your message has been received. I will only reply to UCA email addresses.

Academic Accommodations: The University of Central Arkansas adheres to the requirements of the Americans with Disabilities Act. If you need an accommodation under this Act due to a disability, please contact the UCA Disability Resource Center, 501-450-3613.

Assignment Details:

Laboratory Notebooks	<p>You must use a notebook with pages permanently bound (this does not include a spiral bound notebook). Your notebook must be only for Advanced Inorganic Lab and contain no other notes.</p> <p>You must use permanent ink to write in your lab notebook.</p> <p>Notebooks will be evaluated weekly after each lab for course credit and must follow the “Laboratory Notebook Procedures” indicated on the course Google Classroom.</p>
Lab Summaries	<p>Due one week after the lab work was completed.</p> <p>These reports may be hand written in your notebook.</p> <p>Focus on data summary/organization and brief interpretation of results.</p> <p>The outline of your conclusion should be made in minor reports.</p> <p>Make sure your ideas flow logically from one idea to the next, following the general suggestion described in Laboratory Summary Write-Up Advice.</p> <p>Spectra must be attached to the notebook pages.</p>
Major Lab Reports	<p>Due two weeks after the lab work was completed.</p> <p>All major reports must be typed and submitted electronically in Google Classroom. You must use the Major Laboratory Reports Write-Up Advice to meet specific requirements on format and sections.</p> <p>Hard copies will be accepted if preferred.</p>
Technique Skills, Safety, & Participation	<p>You should demonstrate the ability to apply skills learned in Quantitative Analysis lab CHEM 3520. Ensure you use lab time wisely.</p> <p>See “Note on Technique from Dr. Yang” below.</p> <p>You must be wearing your lab goggles/safety glasses and proper attire (pants and close-toed shoes) before entering to avoid losing lab points. This grade also includes lab cleanliness and collaboration.</p> <p>Your lab grade each day can decrease if you do any of the following:</p> <p><i>forget goggles or dressed improperly (each item)</i> <i>no lab manual or lab notebook</i> <i>come to lab unprepared</i> <i>fail to contribute effectively to the group’s efforts</i> <i>do not clean-up</i> <i>eating, drinking, or removing goggles during lab</i></p> <p>Lab safety is essential. Thus, you only get one (1) warning to follow safety guidelines. After the second warning, you will lose 1 point. A third warning you lose 3 points. A fourth warning you will be dismissed from lab with a grade of zero for that lab day. Warnings can come from your TA(s) or visiting instructors also.</p> <p>**Must complete <u>laboratory safety agreement</u> online before first lab day: https://www.uca.edu/web/forms/view.php?id=1487</p>

COURSE SCHEDULE will be on Google Classroom under Course Info.
Your lab group will decide the lab schedule before Mon Jan 20th at 8 am
Also review the Syllabus Supplement on Google Classroom

Technology Instructions:

Google Classroom – contains lab manuals, handouts, announcements, syllabus, evaluation forms, etc.

You will receive an invitation to your UCA email account to access it.

WebMO – You will use this online portal to conduct computational calculations which will aid in applying and understanding core concepts in the course.

You are encouraged to attend office hours to learn more or if you are uncertain about the program after following directions in course assignments.

See Course Schedule document on Google Classroom for more details.

Tentative Rotation Schedule:

We will strive to follow the below “rotation schedule” for laboratory experiments.

Date (Tues)	Topic	Deadlines
Jan 14	Practice: recording ATR IR, UV-vis Review lab manuals & planning	
Jan 21	First Rotation begins (5 weeks, 2 experiments)	1 st lab report
Jan 28		
Feb 4		
Feb 11		2 nd lab report
Feb 18		
Feb 25	Second Rotation begins (4 weeks, 1 experiment)	
Mar 3		3 rd lab report
Mar 10		
Mar 17		
Mar 24	– SPRING BREAK – ACS National Meeting –	
Mar 31	Third Rotation begins (3 weeks, 2 experiments)	4 th lab report
Apr 7		
Apr 14		
Apr 21	Lab Clean-up Day	5 th lab report
Apr 28	– FINALS WEEK – no lab –	6 th lab report

Experiment List:

#	Experiment	Characterization Tools	Other tools
1	First day practice	UV-vis, IR	Inert atmosphere cannula transfer
<u>First Rotation</u>			
2	WO ₃ , H ₂ intercalation	IR, Mag. Susceptibility	Conductivity
3	Ammine-borane hydrolysis	IR, NMR (¹¹ B and ¹ H)	
5	Cu(Gly-Gly) hydroxyl radicals	UV-vis	
6	Aerobic alcohol oxidation	¹ H NMR, IR	
7	Polyvalent iodine complexes	UV-vis, ³¹ P NMR	
8	KTp* synthesis by MW methods and TM complexes	UV-vis, ¹¹ B NMR, IR	
<u>Second Rotation</u>			
9	Metal Complex UV-vis/magnetism	UV-vis, Magnetic Measurement	
<u>Third Rotation</u>			
11	Cu(en) _x ²⁺ , Ni(en) _y ²⁺ , Job plots		
12	RuCl ₂ (dppb)(phen) isomerism	³¹ P NMR, E-chem	Inert atmosphere
13	Redox behavior of iron complexes	¹³ C NMR, E-chem	Inert atmosphere
14	Mo-Mo multiple bond	Solid UV-vis, IR	Inert atmosphere
15	Iron porphyrin complexes	NMR, Magnetic measurement	
16	Suzuki cross-coupling reaction catalyzed by Ni(II) complexes	¹⁹ F NMR, UV-vis, FT-IR	Inert atmosphere

Syllabus highlights:

- **Attendance is mandatory** for this course.
 - You are allowed one (1) absence
 - If exceed three (3) unexcused absences you will earn a course grade of W.
- **No** make-up labs offered. Stay healthy!
- Late assignments only graded 2 days after due date and will earn **at most** 50% credit.
- Use office hours effectively: come see me early in the course and come prepared.
- Lab notebooks due at the end of each lab period
 - Will be returned in Adv Inorganic Class (CHEM 4380) following Thursday
- Minor Lab Reports due one (1) day after complete lab
- Major Lab Reports due on Google Classroom two (2) days after complete lab
 - Follow instructions in Major Laboratory Reports Write-Up Advice document
- Lab Rotations:
 - Each group will work according to a rotation set
 - You and your group choose the experiments
 - You and your group are expected to roughly follow the Rotation Schedule

A Note on Technique from Dr. Yang:

Good lab technique includes advanced preparation, safe work, and efficient use of lab time. Advance planning includes such things as acquiring specialty chemicals or equipment. It also includes discussions with me to learn how to operate new equipment or how to setup certain experiments. Safe work includes the use of appropriate eye protection and proper care using chemicals and equipment. Efficient lab workers maximize their productivity by planning ahead and performing multiple tasks. Instead of waiting to be told, ask yourself "What else needs to be done while I'm waiting." If you finish early on an experiment or have "down time" while a synthesis runs, use the time to outline your summary write-up or plan for the future week's work. Maximum use of the in-class time can greatly reduce headaches later on while you are alone at home.

Your Lab Group Members:

Partner 1: _____

Partner 2: _____

First Rotation:

Lab 1: _____

Lab 2: _____

Third Rotation:

Lab 1: _____

Lab 2: _____