Villanova University – Department of Chemistry
CHM 3301 Section 001 (CRN 28307), Section 002 (CRN 41743)

Chemistry 3301–001 and –002 Inorganic Chemistry Laboratory II Fall 2019

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Office hours: M 3-4pm, W 10:30-11:30am, F 1:30-2:30pm and by appointment

Teaching Assistant:
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Laboratory: Section 001: R 12:30 pm–4:20 pm, Mendel 206
Section 002: T 12:30 pm–4:20 pm, Mendel 206

Required Texts: (1) *The ACS Style Guide*, 3rd Edition, A. M. Coghill and L. R. Garson, Eds., Oxford University Press, 2006. ISBN-13: 978-0-8412-3999-9
(2) Chemistry laboratory notebook – (you may use one from prior chemistry lab)

Course Description and Learning Objectives:
This class will involve the synthesis, isolation, purification, and characterization of a variety of inorganic compounds. The laboratory is designed to reinforce concepts from CHM 3311 and to allow you to learn the basic techniques and skills employed by practicing inorganic chemists. This course also places a strong emphasis on written and spoken scientific communication. Over the course of the semester, each student will submit two written communications (individual effort), give one poster presentation (with lab partner(s)) and give one oral presentation (with lab partner(s)). Assignments are listed on page 6 of the syllabus. We will use formatting from the American Chemical Society journal, *Inorganic Chemistry* (communications) as the standard for written communications. Suggestions for effective poster presentations and oral presentations may be found in the *ACS Style Guide (2nd edition)*.

Important dates:

- Last day for drop/add: September 1
- Labor Day: September 2
- Semester recess (no lab): October 14-18
- Midterm grades submitted: October 23
- Advising begins for Spring 2020: October 25
- Last day for authorized withdrawal: November 15
- Thanksgiving recess (no lab): November 27-29

Academic Integrity:
All students are expected to uphold Villanova's Academic Integrity Policy and Code. Any incident of academic dishonesty will be reported to the Dean of the College of Liberal Arts and Sciences for disciplinary action. For the College's statement on Academic Integrity, you should consult the *Enchiridion*. You may view the university's Academic Integrity Policy and Code, as well as other useful information related to writing papers, at the Academic Integrity Gateway web site: http://library.villanova.edu/help/academicintegrity

Office of Disabilities (ODS) and Learning Support Services (LSS):
It is the policy of Villanova to make reasonable academic accommodations for qualified individuals with disabilities. Go to the Learning Support Services website (http://learningsupportservices.villanova.edu) for registration guidelines and instructions. For physical access or temporarily disabling conditions, please contact the Office of Disability Services at 610-519-4095 or email Stephen.mcwilliams@villanova.edu. Registration is needed in order to receive accommodations.

Absences for Religious Holidays:
Villanova University makes every reasonable effort to allow members of the community to observe their religious holidays, consistent with the University's obligations, responsibilities, and policies. Students who expect to miss a class or assignment due to the observance of a religious holiday should discuss the matter with their professors as soon as possible, normally at least two weeks in advance. Absence from classes or examinations for religious reasons does not relieve students from responsibility for any part of the course work required during the absence.
https://www1.villanova.edu/villanova/provost/resources/student/policies/religiousholidays.html

As a courtesy to your peers, please set aside your cell phones during lab. When your phone is needed as a timer, use a plastic baggie to cover your phone - don't use your touch screen with gloved hands!!!

Grading:
- Written Communications (2): 30%
- Oral Presentation: 15%
- Poster Presentation: 15%
- Laboratory Notebook: 20%
- Technical Grade: 10%
- Final Exam: 10%

Grading Policy:
- *Written Communications (30%)*: A communication-style paper (template available on Blackboard) is required for two experiments; assignments are listed on page 6 of the syllabus. These written communications must be written in your own words and submitted individually. Each report is due *one week following* completion of the experiment. The assignment must be submitted electronically using Blackboard by 12:30 pm on your assigned laboratory day. Late assignments will not be accepted. These reports must include all pertinent sections from the communication template and incorporate answers to all in-lab and lab handout questions.
- *Oral presentation (15%)*: A 10-minute PowerPoint presentation is required for one experiment; assignments are listed on page 6 of the syllabus. You and your partner(s) will work together to prepare and present this oral presentation. The presentation must include your title and authors, a statement of purpose, your experimental outcomes and representative data, conclusions, and future work. You will be evaluated on presentation quality, equitable distribution between partners for workload, and adherence to the 10-minute timeframe. Your PowerPoint file must be submitted to Dr. Zubris by email 1 hour prior to the scheduled presentation.
- *Poster presentation (15%)*: A poster presentation is required for one experiment; assignments are listed on page 6 of the syllabus. You and your partner(s) will prepare this poster and answer instructor questions about your work during the scheduled presentation time. The poster

presentation must include your title and authors, a statement of purpose, your experimental outcomes and representative data, conclusions, and future work. Sixteen to twenty slides are recommended to convey your work. You will be evaluated on the ability of your poster to stand on its own to convey your lab findings, the quality of visuals, equitable distribution between partners for workload, and answers to instructor questions. Bring your printouts with you on your scheduled presentation day and hang up your poster as directed by the instructor.

- *Laboratory Notebook (20%)*: This grade will be comprised of a pre-laboratory assignment and your in-lab observations. Both components must be recorded directly in your laboratory notebook.
  - Each pre-laboratory assignment must contain the following sections: (1) a purpose for the experiment, (2) chemical equations (including chemical structures) for all chemical reactions, (3) tables of physical and chemical properties for all reagents and solvents, (4) a description of safety concerns for *all* chemicals to be handled and any notable technique-specific concerns, and (5) an outline of the experimental procedure. For multi-week experiments, you will submit a comprehensive pre-lab assignment (a full accounting of the multi-week purpose, chemical equations, safety concerns, and procedure) at the start of the first week for the experiment.
  - Observations should be recorded directly in your notebook as you carry out your experiment. Keep a running record of your observations and procedures as you carry them out. Do not rely solely on your pre-lab procedure, but record what is *actually* done. Data (measured masses, volumes, etc.) should be recorded directly in your notebook as you acquire the information. Be sure that your observations also include each characterization method performed, sample identity and preparation, and electronic file names. Consult with your instructor for further guidance.
  - Your notebook will serve as a permanent record of your laboratory activities. AS A GUIDING PRINCIPLE, YOUR NOTEBOOK SHOULD CONTAIN ENOUGH INFORMATION SO THAT ANOTHER PERSON WITH BASIC KNOWLEDGE OF CHEMISTRY COULD REPEAT THE EXPERIMENT USING ONLY YOUR NOTEBOOK PAGES.
  - Pre-laboratory assignments are due at the beginning of the lab and will be reviewed by your instructor before you start your experiment. *Late assignments will not be accepted.*
  - All laboratory notebook pages (carbon-copies) for a given multi-week experiment are due one week after the experiment is completed. Printouts of *all* spectral data are also required and must be appended to your lab notebook submission.
- *Technique Grade (10%)*: You will be assigned a grade each week that reflects your preparedness, execution of the experiment, overall teamwork, and adherence to safety guidelines. At the conclusion of each lab session, you must obtain a signature in your laboratory notebook from the teaching assistant to verify that your notebook contains a detailed accounting of the experiment and that you are ready to clean up and go.
- *Final Exam (10%)*: The final exam will be an open notebook exam that is designed to encourage high quality and complete in-lab observations and data recording. The exam will also cover topics from pre-lab and in-lab discussions and the theory behind the experiments. The final exam will be administered during the week of December 2nd at your scheduled laboratory time.

- Final grades will be assigned according to the following scale:
  - 90–100% A^- / A
  - 75–89% B^- / B / B+
  - 60–74% C^- / C / C+
  - 45–59% D^- / D / D+
  - < 45% F

Grading System:*
Faculty members are responsible for maintaining the integrity of the evaluation and grading system. Presented below is the Undergraduate Grading System.

A	Is the highest academic grade possible; an honor grade which is not automatically given to a student who ranks highest in the course, but is reserved for accomplishment that is truly distinctive and demonstrably outstanding. It represents a superior mastery of course material and is a grade that demands a very high degree of understanding as well as originality or creativity as appropriate to the nature of the course. The grade indicates that the student works independently with unusual effectiveness and often takes the initiative in seeking new knowledge outside the formal confines of the course.
B	Is a grade that denotes achievement considerably above acceptable standards. Good mastery of course material is evident and student performance demonstrates a high degree of originality, creativity, or both. The grade indicates that the student works well independently and often demonstrates initiative. Analysis, synthesis, and critical expression, oral or written, are considerably above average.
C	Indicates a satisfactory degree of attainment and is the acceptable standard for graduation from college. It is the grade that may be expected of a student of average ability who gives to the work a reasonable amount of time and effort. This grade implies familiarity with the content of the course and acceptable mastery of course material; it implies that the student displays some evidence of originality and/or creativity, works independently at an acceptable level and completes all requirements in the course.
D	Denotes a limited understanding of the subject matter, meeting only the minimum requirements for passing the course. It signifies work which in quality and/or quantity falls below the average acceptable standard for the course. Performance is deficient in analysis, synthesis, and critical expression; there is little evidence of originality, creativity, or both.
F	Indicates inadequate or unsatisfactory attainment, serious deficiency in understanding of course material, and/or failure to complete requirements of the course.
N	Incomplete: course work not completed.

* Reproduced from the VU Faculty Handbook

General Policies:

Absence policy: Attendance in laboratory is mandatory. If you miss a lab, or plan on missing a lab, for a legitimate reason (an excused absence, such as illness or university obligation) *contact your instructor as soon as possible to discuss your absence*. Excused absences will not be counted against you in your grade for the course. In the event of an excused absence, *it is the student's responsibility to meet with the instructor to make up the work that was missed during the excused absence*. An unexcused absence will lead to a grade of "zero" for work associated with the missed laboratory period, *and hence multiple absences may ultimately lead to a failing grade in the course*.

Partners: Students will typically work in pairs for experiments. While students are encouraged to work together as lab partners and to discuss lab results as a group, *all entries in your lab notebook and all lab reports must be written in your own words and submitted individually*. *IT IS UNETHICAL TO COPY PRE-LABS AND/OR OTHER PARTS OF YOUR LAB REPORTS FROM OTHER PERSONS OR SOURCES.*

Preparedness: Students must come to the laboratory prepared; this includes reading the laboratory handout and completing the prelab assignment. Being prepared is imperative for completion of the experiments in a timely fashion and for safety reasons.

On-time arrival: Safety instructions and other procedures will be discussed at the beginning of the lab period, therefore it is very important to *be prepared and on time*.

Safety, attire:

a. **Approved safety goggles must be worn at all times while in the lab during the lab period**. They must be worn over the eyes, not on the forehead.
b. **Lab coats**. Lab coats are provided for your use and you must wear them at all times in the laboratory. If your lab coat becomes very soiled, place it in the designated bin for laundering and obtain a clean lab coat. All lab coats are returned during the last week of lab.
c. **No exposed skin below the waist**. Unacceptable clothing includes (but is not limited to): shorts, skirts, Capri pants, tights, leggings, 'jeggings', yoga pants, 'skinny' jeans, pajama pants, sandals, open-toe shoes (or any shoes in which the top of the foot is exposed – e.g., ballet flats), etc.
d. **Appropriate attire** for a chemistry laboratory course might include: t-shirt, jeans, and sneakers / tennis shoes with socks. We will discuss this further during the first lab session.
e. **Students in violation of these rules are not allowed in the lab; no exceptions will be made**. Students who are in violation of attire / behavior rules or those outlined in the safety contract that is signed at the beginning of the semester may be issued a warning (student signature required). Repeat violations will result in dismissal from the lab for the period with an unexcused absence (grade of 0) recorded for the period. The Laboratory Absence (Attendance) Policy will apply in these cases.

Safety, food and drink: Eating, drinking, and gum chewing are not allowed in the laboratory.

Chemical use and lab cleanliness: Common sense and consideration of fellow workers must be exercised rigorously and constantly. This includes proper disposal of chemical waste and keeping the laboratory clean. ALL STUDENTS ARE REQUIRED TO INSURE THAT HIS OR HER LAB BENCH AND HOOD SPACE ARE CLEAN BEFORE LEAVING LAB FOR THE DAY AND TO INSURE THAT THE LAB COMMON AREAS ARE KEPT CLEAN DURING THE LAB. This will be an important part of your technique grade.

Sign-out: Once you have cleaned up your fume hood and common areas at the end of the lab period, sign-out with your instructor or TA before leaving for the day.

Electronic data: Bring a USB thumb drive to class for transferring data off of the instrumentation.

Email: Aside from in-class announcements, e-mail will be my primary form of communication with you. Please check your Villanova email address regularly. If you want to get in touch with me, you can reach me by email, during office hours, or by appointment. I'll do my best to respond to emails within 24 hours during the week and 48 hours during the weekend and breaks. (FYI, I'm early-to-bed-early-to-rise, so I typically won't see late night emails until early the next morning.)

Schedule of Experiments

		Date	
Week #	**Experiment**	**Section 001**	**Section 002**
1	Check-in / Scientific Writing Workshop	8/27	8/29
2	Coordination complexes – part I	9/3	9/5
3	Coordination complexes – part II	9/10	9/12
4	Coordination complexes – part III	9/17	9/19
5	Bioinorganic – part I	9/24	9/26
6	Bioinorganic – part I	10/1	10/3
7	Bioinorganic – part II	10/8	10/10
8	Photochemistry – part I	10/22	10/24
9	Photochemistry – part II	10/29	10/31
10	Photochemistry – part III	11/5	11/7
11	Organometallics – part I	11/12	11/14
12	Organometallics – part II	11/19	11/21
13	Final Exam and Check-out	12/3	12/5

* no lab on 11/26(T), 12/12(R), *
Note: the laboratory schedule is subject to change. All changes will be announced by email.

All laboratory handouts will be posted on Blackboard the week prior to a given experiment. It is your responsibility to read the handouts, consult the chemical literature as needed, and prepare your pre-laboratory assignment in your lab notebook prior to the lab session.

"Lab report" format for each experiment and lab group. Lab groups will be assigned during lab.

		group assignments for "lab report" format		
Week #	**Experiment**	**Oral presentation**	**Poster presentation**	**Written Communication**
5	Coordination complexes – week of 9/23	2, 3, 6, 7	1, 4, 5, 8	
8	Bioinorganic – week of 10/21		2, 3, 6, 7	1, 4, 5, 8
11	Photochemistry – week of 11/11	1, 4, 5, 8		2, 3, 6, 7
13	Organometallics – week of 12/2			1-8

Chemical Safety:
If you wish to learn more about the reagents we are using in the lab, you may utilize the MSDS Online program, which is a database of material safety datasheets (MSDS). The link to MSDS Database (MSDS Online) may be found under the Safety Resources tab of this page of the Dept. of Chemistry website:
https://www1.villanova.edu/villanova/artsci/chemistry/Safety_Page.html
and also on the right side of the Villanova University Environmental Health and Safety website:
https://www1.villanova.edu/villanova/fmo/ehs.html

Villanova's on-line lab safety training program:
Prior to our first experiment (Sept. 3rd and 5th for Tuesday and Thursday lab sections), you are expected to complete computer based laboratory safety training, available for self-enrollment via Blackboard (please note that these modules are best viewed in Chrome):

Students who previously completed the three required training modules may choose the Laboratory Safety Refresher in lieu of repeating the three initial modules.

- Log in to Blackboard (http://elearning.villanova.edu)
- In the Organization Catalog module, click the link for "Available for Self-Enrollment"
- Under the "Search Catalog" heading, click the "Search Entire Catalog" radio button
- Enter Fall 19 in the search box
- You will see the result: envSafety_Fall19_labsafety.
- Put your cursor over the "envSafety_Fall19_labsafety" and click the **down arrow** that appears to the right.
- Click "Enroll" then "Submit" then "OK". You will then be enrolled in the organization.

You will see three folders:
- Required training modules
- Laboratory safety refresher
- Optional training modules

Students who have not previously completed the on-line training must complete the three modules in the Required Training Modules folder:
1. University Laboratory Safety – Analyzing Hazards
2. University Laboratory Safety – Developing and Using Controls
3. University Laboratory Safety – Working Safely

Students who previously completed the three required training modules may choose the Laboratory Safety Refresher in lieu of repeating the three initial modules.

When you finished all three modules, click on "Print Certificate" (left menu bar). Then, click on "Fall 19 Lab Safety Certificate" and save it as a .pdf file. Upload this .pdf file to our course Blackboard site for the assignment "Villanova's on-line lab safety training program**"** to receive credit for safety training course completion.