

**Chemistry 3311-001**

**Inorganic Chemistry 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

*Required Textbook:*

*Inorganic Chemistry*, 5<sup>th</sup> Edition, Gary L. Miessler, Paul J. Fischer, and Donald A. Tarr, 2013, Pearson (ISBN-13: 9780321811059, ISBN-10: 0321811054).

*Lecture:* MWF 9:30–10:20 am, 256 Mendel Hall

*Course Content and Learning Objectives:* Inorganic chemists investigate every element of the periodic table. Understandably, inorganic chemistry plays an increasingly important role in many aspects of modern-day life. Materials science, polymer science, agriculture, and pharmaceuticals all benefit from advances in the field of inorganic chemistry. This course will emphasize the fundamentals of inorganic chemistry as a basis for understanding current applications and advances. Topics such as symmetry, molecular orbital theory, acids and bases, solid-state chemistry, coordination compounds, crystal field and ligand field theory, reaction mechanisms, and organometallics will be discussed. Throughout the course, there will be an emphasis on chemical bonding and characterization of inorganic complexes.

By the end of the semester you should:

- understand the fundamentals of symmetry and group theory and how to apply these concepts;
- have a working knowledge of molecular orbital theory and use it as a tool to understand bonding;
- understand the fundamentals of acid/base theory, especially Lewis acids and bases and the relevance of acid/base theory to coordinate covalent bonds (metal-ligand bonds);
- have an introductory knowledge of solid-state chemistry and its relevance to materials chemistry;
- have a basic understanding of coordination compounds, their common geometries, and ligands;
- have a working knowledge of bonding models for coordination compounds and how these can be used to rationalize spectroscopic properties, magnetic properties, and chemical reactivity;
- understand the importance of organometallic complexes and how the 18-electron rule can be used to predict chemical reactivity and, in some cases, applications in catalysis

*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](mailto:Stephen.mcwilliams@villanova.edu). Registration is needed in order to receive accommodations.

Villanova University – Department of Chemistry  
CHM 3311 Section 001 (CRN 28308)

*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>

*General Policies:*

- Please be respectful of your peers: arrive promptly for class and silence your electronic devices (cell phones, etc). Laptops will not be needed nor permitted in class except when specified. During quizzes and exams, all cell phones must be put away for the full testing period.
- 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.)
- *Exams:* A cumulative 50-minute midterm exam will be held during class on Wed. Oct. 9. The final exam will be cumulative and will be held during final exam period on Tues. Dec. 17 from 2:30–5:00 pm. Unexcused absences for exams will result in a grade of zero. Makeup exams are only possible in the event of an excused absence – you must contact me as soon as possible to make arrangements.
- *Quizzes:* Quizzes will be held during the first 25 minutes of class on the following days: Quiz 1 (Sept. 11), Quiz 2 (Sept. 25), Quiz 3 (Oct. 30), Quiz 4 (Nov. 13), and Quiz 5 (Dec. 4). Unexcused absences for quizzes will result in a grade of zero. Makeup quizzes are only possible in the event of an excused absence – you must contact me as soon as possible to make arrangements. The quiz problems will be similar in style and difficulty to exam problems.
- *Chemical literature assignment:* At the midpoint of the semester, each student will choose a paper from the inorganic chemical literature to be the subject of a guided written assignment, an in-class discussion with assigned classmates, and a one-page multi-part final exam question (including answer key). The in-class discussion will take place *after* you complete a draft of the guided written assignment. This discussion will help you to address potential deficiencies in your written assignment and final exam question before submitting them for grading. The overall purpose of this assignment is to summarize and interpret a paper from the inorganic chemical literature and apply our classroom concepts to a modern chemical problem. I will compile all of the submitted final exam questions and share them with the class; some of these may be used for our final exam.
- *Problem sets* will be distributed periodically throughout the course. While problem sets will not be collected and graded, they are intended to reinforce concepts from class so I suggest that you give them your best effort. Some of our class time will be allocated to review homework problems that the class finds especially challenging. Some of these problems will be similar in difficulty and content to the problems on quizzes and exams.

*Grading:*

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|-----------------|-----|-----------------------------------|-----|
| • Midterm Exam: | 15% | • Chemical literature assignment: | 15% |
| • Quizzes (5):  | 35% | • Final Exam:                     | 35% |

Villanova University – Department of Chemistry  
CHM 3311 Section 001 (CRN 28308)

*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

*Important dates:*

- Last day for drop/add: September 1
- Labor Day (no class): September 2
- Fall Break (no class): October 14-18
- Midterm grades submitted: October 23
- Advising begins for Spring 2020: October 25
- Last day for WX: November 4
- Thanksgiving recess (no class): Nov 27-29
- Friday UG class day: December 10
- Last day of this class: December 11
- Quiz 1: Wed. September 11
- Quiz 2: Wed. September 25
- Midterm Exam: Wed. October 9
- Submit paper for inorganic chemical literature assignment: Fri. October 11
- Quiz 3: Wed. October 30
- Quiz 4: Wed. November 13
- Quiz 5: Wed. December 4
- Final Exam: Tues. Dec. 17, 2:30-5:00pm