

Dr. Jason Smee

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(best)

• 903.566.7069

• RBS 3030

Howdy (Office) Hours

• M–F: 10:30 – 11:30 am

• and by appointment

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# CHEM 3320.001

## Inorganic Chemistry

CHEM 3320.001 Inorganic Chemistry

RBN 3035, TR 8:00—9:20 AM

### Course Description

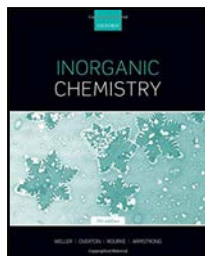
This is an introductory inorganic chemistry course, which will focus on basic areas such as periodic trends, coordination chemistry, kinetics and mechanisms of inorganic reactions, simple bonding theories, and solid-state inorganic chemistry. A more complete list of topics is shown later in the syllabus. Fundamental topics from General Chemistry will also be reviewed and expanded in the context of inorganic chemistry. (*IF* time permits, we may also cover the often overlooked area of lanthanoid/actinoid chemistry).



*"I think chemistry is being frittered away by the hairsplitting of the organic chemists; we have new compounds discovered, which scarcely differ from the known ones and when discovered are valueless—very illustrations perhaps of their refinements in analysis, but very little aiding the progress of true science."*

— Michael Faraday (ca. 1845)

### Required & Recommended Materials



The **recommended** text is *Inorganic Chemistry 7/e* by Weller et al. ISBN-13: 9780198768128.

(6/e acceptable, some chapter numbers have changed)

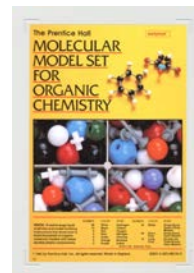


A scientific calculator (capable of exponents and logarithms) is **required**.

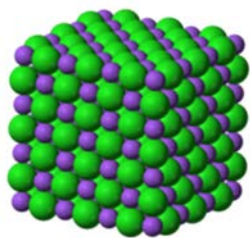


*Achieve Essentials for Inorganic Chemistry* homework is **required**. Cheapest option is to purchase online. ISBN-13: 9781319491130

See page 3 for details.



An organic/inorganic model kit (a common example is shown at left) is **recommended**, but not required. If you purchase one, make sure at least two of the atoms are six-coordinate.



**Structure of NaCl represented as a series of green (Cl) and purple (Na) spheres.**

*"Chlorine is a deadly poison gas employed on European battlefields in World War I. Sodium is a corrosive metal which burns upon contact with water. Together they make a placid and unpoisonous material, table salt."*  
~ Carl Sagan



## Student Learning Outcomes

By the end of this course, students should be able to

- 1) correctly name main-group and coordination compounds
- 2) describe, identify, and draw the isomers formed by coordination compounds
- 3) utilize bonding theories to predict the effects of charge, electron configuration, and the types of ligands on the structure and reactivity of coordination compounds
- 4) calculate crystal field stabilization energies and magnetic moments from electron configurations
- 5) describe and/or calculate the properties of various types of crystal lattices
- 6) predict and identify periodic trends such as effective nuclear charge, the inert pair effect, the uniqueness principle, and the diagonal effect
- 7) employ Latimer, Frost, and Pourbaix diagrams to solve redox problems
- 8) Identify point groups of molecules, ions, and metal complexes

## Canvas

I will utilize Canvas to post the following items

- 1) syllabus
- 2) lecture notes & recorded lectures
- 3) due dates for Sapling homework assignments
- 4) grades (my Excel grade book is the official grade book)
- 5) links to tutorial videos
- 6) links to interesting websites



## Course Requirements

- 1) CHEM 1312/1112 (General Chemistry II and Lab) is a pre-requisite.
- 2) CHEM 3121 (Inorganic Chemistry Lab) is required to fulfill degree requirements; if CHEM 3320 is taken as an elective then the lab is not required.
- 3) CHEM 3342/3143 (Organic Chemistry I and Lab) is helpful, but **not required**.
- 4) We meet Tuesday and Thursday from Jan 14 to April 24 at 8 am in RBN 3035 (except during Spring Break).
- 5) You must take the ACS standardized final exam (Tuesday, April 29<sup>th</sup>) to pass the class.

## Attendance!

- I will take attendance in this class by sign in sheet. Please participate!!!!
- The more you participate, the more you will get out of class!
- *Each exam will have a review session **IF** class attendance is  $\geq 80\%$  for the days that exam's material covers. Otherwise **NO REVIEW** session and you will need to come to my office to ask questions on exams.*

## Grading

- The official gradebook is the Excel file on my desktop computer (in case Canvas has issues).
- Achieve assignments will be shown on Canvas.
- Grades will be tentatively based on a 90/80/70 scale, but may be adjusted based upon my evaluation of the class's overall performance.
- Extra credit will be available on Achieve only!

Achieve Homework	15%
Mastery Checks & Paper Assignments	10%
3 "midterm" exams	60%
Cumulative final exam	15%
<b>Total</b>	<b>100%</b>

### Achieve Homework (15% of course grade)



We will use the *Achieve Essentials for Inorganic Chemistry* platform (~\$47).

*I promise it is MUCH easier than the Analytical version.*

- Homework will be due 5 days after finishing the chapter's material. This class meets Tuesday and Thursday, so due dates are either Sundays or Tuesdays.
- All assignments will be posted on Canvas. Please try to complete homework assignments on time. Desktops, laptops, or tablets are recommended.
- Do not buy "USED" Achieve access codes, they probably won't work!

#### **To enroll in the Achieve section for this course follow the steps below**

- Navigate to the Achieve Access Module on Canvas and click on Achieve Home to connect your Canvas and Achieve Accounts.
- Follow these [instructions](#) for help connecting Achieve through Canvas.
- You will need to **enter your 10-digit UT Tyler student ID** when you sign up. This helps me easily import homework grades into my Excel spreadsheet.

#### **Other helpful links**

- How to [convert your free trial to full access](#) (if needed).
- [Customer Support for students](#) (from here you can initiate a chat if you need help that is not listed on this page)
- [Troubleshooting guide](#) if you experience problems with Achieve.
- Browse [Achieve: Getting Started Guide for Students](#)

### Mastery Checks & Paper Assignments (10% of course grade)

- There will be short "quizzes", or Master Checks (MaCks), assigned on Canvas after each lecture that cover the lecture's material. These will be due by 11:59 pm the same day, but can be submitted for full credit one day AFTER the lecture (Wed or Fri at 11:59 pm). This repetition of the material (and requiring you to recall it) has been shown to improve retention.
- There will also be a few paper assignments that will be collected over the course of the semester. Each of these assignments will be weighted equally with the MaCks.

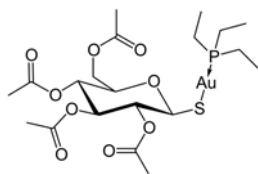


**Alfred Werner**  
"Father of  
Coordination  
Chemistry"  
1913 Chemistry  
Nobel Prize

*"Will fluorine ever have practical applications? It is very difficult to answer this question... A scientific research is a search after truth, and it is only after discovery that the question of applicability can be usefully considered."*

— Henri Moissan, discoverer of F<sub>2</sub>





AuranoFin™ is a gold compound used to treat arthritis. It is one of a handful of FDA-approved, metal-based drugs.

*“Poison is in everything, and no thing is without poison. The dosage makes it either a poison or a remedy.”*

~ Paracelsus,

16<sup>th</sup> century alchemist



As<sub>2</sub>O<sub>3</sub> while toxic has been shown to be therapeutically useful in the treatment of acute promyelocytic leukemia.

## Midterm Exams (60% of course grade)

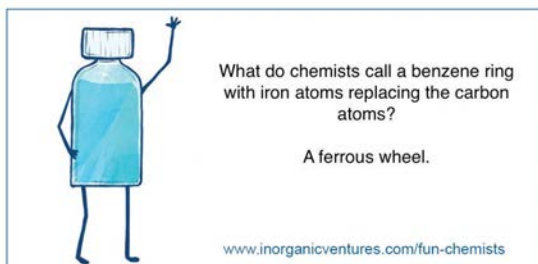
- The three, in-class, midterm exams are worth 60% of your overall grade. They will be mostly multiple choice and some short answer/calculation questions. I'll inform you where each exam's material will be cut off one week in advance.
- **You are permitted a note card for each exam (3 x 5 inch, both sides), but it must be handwritten, no printouts or photocopies.**
- I will also have review sessions (synchronous) and they will be recorded.
- In the event of an excusable situation, please give me 2+ days' notice to re-schedule your exam. Missed exams for unexcused reasons may result in a 0.

## Final Exam (15% of course grade)

- The final exam (Tuesday, April 29<sup>th</sup>) will be an ACS Nationally Standardized exam. The final exam is worth 15% of your grade and is required to pass the class.
- Because the final is comprehensive, it will be used to replace your lowest midterm exam grade (assuming the final exam is not your lowest exam grade).
- The final exam grade will be curved because they are not meant to give scores, but rather comparisons with other students who take the exam nationwide.

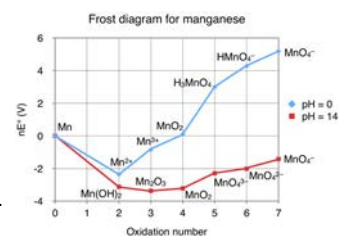
## Important Dates

- January 20 (Monday): MLK Jr. Day — no classes
- January 27 (Monday): Census Date; last day to file for grade replacement
- **February 20 (Thursday): Exam 1**
- March 1 (Saturday): FINAL day to apply for Spring graduation
- March 17–21 (M – F): Spring Break, no classes
- **March 27 (Thursday): Exam 2**
- March 31 (Monday): Last Day to Drop with a “W”
- **April 22 (Tuesday): Exam 3**
- **April 29 (Tuesday): Final Exam, 8:00 am – 10:00 am in RBN 3035**



## Topics to Be Covered (listed by chapter in the textbook, 7/e)

- Chapter 5.1 – 5.16: Acids and Bases (Skip 5.5, 5.8, 5.11, and 5.17)
- Chapter 7: Introduction to Coordination Chemistry (nomenclature, structures, isomers, formation constants, and chelate effect)
- Chapter 20.1 and 20.8-20.9: Electronic Structure (Crystal Field Theory, spectrochemical series, Crystal Field Stabilization Energies, magnetic moments, Jahn-Teller effect, and magnetic coupling)
- Chapter 21 + outside material: Coordination Chemistry Reactions (reaction types, ligand substitution reactions/mechanisms, and redox reactions)
- Chapter 27 + outside material: Medicinal Inorganic Chemistry (treatment of cancer, arthritis, bipolar disorder, and HIV; chelation therapy and imaging agents)
- Chapter 4 + outside material: Structure & Energetics of Solids (unit cells, alloys, lattice energies, Born-Haber cycles and defect structures); Band Theory; Semiconductors
- Chapter 9 + outside material: Periodic Trends (radii, EN, IE, EA, uniqueness principle, diagonal effect, and inert pair effect)
- Chapter 10: Hydrogen & Hydrides (production, reactions, types of hydrides)
- Chapter 6.1-6.4, 6.9, 6.12-6.14: Redox Chemistry (Latimer, Frost, & Pourbaix diagrams)
- Chapter 3.1: Symmetry Operations, Elements, and Point Groups
- Time permitting: Chapters 11–18: Selected topics related to main group elements



**Frost diagram showing the most thermodynamically stable oxidation states of Mn under acidic and basic conditions.**

*I am a teacher, and I am proud of it. At Cornell University I have taught primarily undergraduates, and indeed almost every year since 1966 have taught first-year general chemistry.*

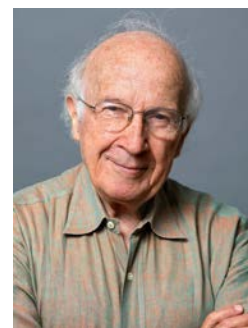
*~Roald Hoffmann  
Nobel Prize in Chemistry, 1981*

## Top 10 Reasons to Study Inorganic Chemistry\*

10. There's more to the periodic table than the first 3 rows.
9. The COLORS...Oooooo...
8. Gloveboxes give you an excuse to say "Smell my finger..."
7. What's just one more ligand...?  
I'm just one reaction away from discovering a room temperature superconductor...I swear...
6. Octahedral geometries are easier to draw.
4. Cyclooctatetraene has more bite!
3. Something about "nano"...
2. Carbon is over-rated.
1. I know how to count higher than 8!



\*List taken from [https://www.cafepress.com/mf/13342360/top-10-reasons-to-study-inorga\\_tshirt?productId=69337098](https://www.cafepress.com/mf/13342360/top-10-reasons-to-study-inorga_tshirt?productId=69337098)



### Tentative Lecture Schedule (*Very Tentative*)

Date	Topics
Jan 14	Syllabus; Start Chapter 5 (Acids and Bases)
Jan 16	Finish Chapter 5, Start Chapter 7
Jan 21	Continue Chapter 7
Jan 23	Continue Chapter 7
Jan 28	Finish Chapter 7
Jan 30	Start Chapter 20A (Electronic Structure)
Feb 4	Chapter 20A (Electronic Structure)
Feb 6	Continue Chapter 20A
Feb 11	Continue Chapter 20A
Feb 13	Finish Chapter 20A; start Chapter 21
Feb 18	Continue Chapter 21
Feb 20	<b>Exam 1</b>
Feb 25	Continue Chapter 21
Feb 27	Start Chapter 27
Mar 4	Continue Chapter 27
Mar 6	Start Chapter 4
Mar 11	Continue Chapter 4
Mar 13	Continue Chapter 4
Mar 18	Spring Break—No classes!!!!
Mar 20	Spring Break—No classes!!!!
Mar 25	Continue Chapter 4
Mar 27	<b>Exam 2</b>
Apr 1	Finish Chapter 4; start Chapter 9
Apr 3	Continue Chapter 9
Apr 8	Finish Chapter 9; start Chapter 6
Apr 10	Continue Chapter 6
Apr 15	Finish Chapter 6
Apr 17	Start Chapter 3.1
Apr 22	<b>Exam 3</b>
Apr 24	Chapters 11-18 (selected topics from Groups 1A to 8A)
Apr 29	Final Exam: RBN 3035 8 – 10 am

**WITHDRAWING FROM CLASS**

Students may [withdraw](#) (drop) from this course using the [Withdrawal Portal](#). Withdrawing (dropping) this course can impact your Financial Aid, Scholarships, Veteran Benefits, Exemptions, Waivers, International Student Status, housing, and degree progress. Please speak with your instructors, consider your options, speak with your advisor, and visit the One-Stop Service Center (STE 230) or email [enroll@uttyler.edu](mailto:enroll@uttyler.edu) to get a complete review of your student account and the possible impacts to withdrawing. We want you to make an informed decision. UT Tyler faculty and staff are here for you and often can provide additional support options or assistance. Make sure to carefully [read the implications for withdrawing from a course and the instructions](#) on using the [Withdrawal portal](#).

Texas law prohibits students from dropping more than six courses during their entire undergraduate career.\* The six courses dropped include those from other 2-year or 4-year Texas public colleges and universities. Consider the impact withdrawing from this class has on your academic progress and other areas, such as financial implications. We encourage you to consult your advisor(s) and Enrollment Services for additional guidance. CAUTION #1: Withdrawing before census day does not mean you get a full refund. Please see the [Tuition and Fee Refund Schedule](#). CAUTION #2: All international students must check with the [Office of International Programs](#) before withdrawing. All international students are required to enroll full-time for fall and spring terms. CAUTION #3: All UT Tyler Athletes must check with the Athletic Academic Coordinator before withdrawing from a course. CAUTION #4: All veterans or military-affiliated students should consult with the [Military and Veterans Success Center](#).

\*Students who began college for the first time before 2007 are exempt from this law.

**ARTIFICIAL INTELLIGENCE STATEMENT**

UT Tyler is committed to exploring and using artificial intelligence (AI) tools as appropriate for the discipline and task undertaken. We encourage discussing AI tools' ethical, societal, philosophical, and disciplinary implications. All uses of AI should be acknowledged as this aligns with our commitment to honor and integrity, as noted in UT Tyler's Honor Code. Faculty and students must not use protected information, data, or copyrighted materials when using any AI tool. Additionally, users should be aware that AI tools rely on predictive models to generate content that may appear correct but is sometimes shown to be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the quality and content of the information you submit. Misusing AI tools that violate the guidelines specified for this course is considered a breach of academic integrity. The student will be subject to disciplinary actions as outlined in UT Tyler's Academic Integrity Policy. Refer to the About This Course section of the UT Tyler Syllabus Module for specific information on appropriate use of AI in your course(s), or see below. For this course, you can use AI programs (ChatGPT, Copilot, etc.) for exam preparation (e.g., generating flashcards and sample test questions). Be aware that in cases where information provided by AI conflicts with the lecture material, the lecture material will take priority. You will NOT be permitted AI on exams. Remember, AI does make mistakes, so I recommend the "trust but verify" policy when it comes to using AI.

**FINAL EXAM POLICY**

Final examinations are administered as scheduled. If unusual circumstances require that special arrangements be made for an individual student or class, the Dean of the appropriate college, after consultation with the faculty member involved, may authorize an exception to the schedule. Faculty members must maintain student final examination papers for a minimum of three months following the examination date.

**INCOMPLETE GRADE POLICY**

If a student, because of extenuating circumstances, is unable to complete all the requirements for a course by the end of the semester, then the instructor may recommend an Incomplete (I) for the course. The "I" may be assigned in place of a grade only when all of the following conditions are met: (a) the student has been making satisfactory progress in the course; (b) the student is unable to complete all coursework or final exam due to unusual circumstances that are beyond personal control and are acceptable to the instructor; and (c) the student presents these reasons before the time that the final grade roster is due. The semester credit hours for an Incomplete will not be used to calculate the grade point average.

The student and the instructor must submit an Incomplete Form detailing the work required and the time by which the work must be completed to their respective department chair or college dean for approval. The time limit established must not exceed one year. Should the student fail to meet all the work for the course within the time limit, then the instructor may assign zeros to the unfinished work, compute the course average for the student, and assign the appropriate grade. If a grade has yet to be assigned within one year, then the Incomplete will be changed to an F, or NC. If the course was initially taken under the CR/NC grading basis, this may adversely affect the student's academic standing.

**GRADE APPEAL POLICY**

Disputes regarding grades must be initiated within sixty (60) days from the date of receiving the final course grade by filing a Grade Appeal Form with the instructor who assigned the grade. A grade appeal should be used when the student thinks the final course grade awarded does not reflect the grades earned on assessments or follow the grading scale as documented in the syllabus. The student should provide the rationale for the grade appeal and attach supporting document about the grades earned. The form should be sent via email to the faculty member who assigned the grade. The faculty member reviews the rationale and supporting documentation and completes the instruction section of the form. The instructor should return the form to the student, even if a grade change is made at this level. If the student is not satisfied with the decision, the student may appeal in writing to the Chairperson of the department from which the grade was issued. In situations where there is an allegation of capricious grading, discrimination, or unlawful actions, appeals may go beyond the Chairperson to the Dean or the Dean's designee of the college from which the grade was issued, with that decision being final. The Grade Appeal form is found in the [Registrar's Form Library](#).

NOTE: The Grade Appeal Form is different from the Application for Appeal form submitted to the Student Appeals Committee, which does not rule on grade disputes as described in this policy.

## **DISABILITY/ACCESSIBILITY SERVICES**

In accordance with Section 504 of the Rehabilitation Act, Americans with Disabilities Act (ADA) and the ADA Amendments Act (ADAAA), the University of Texas at Tyler offers accommodations to students with learning, physical, and/or psychological disabilities. If you have a disability, including a non-visible diagnosis such as a learning disorder, chronic illness, TBI, PTSD, ADHD, or a history of modifications or accommodations in a previous educational environment, you are encouraged to visit <https://hood.accessiblelearning.com/UTTyler/> and fill out the New Student application. The Student Accessibility and Resources (SAR) office will contact you when your application has been submitted and an appointment with the Assistant Director Student Accessibility and Resources/ADA Coordinator. For more information, including filling out an application for services, please visit the SAR webpage at <https://www.uttyler.edu/disability-services>, the SAR office located in the Robert Muntz Library, LIB 460, email [saroffice@uttyler.edu](mailto:saroffice@uttyler.edu), or call 903.566.7079.

## **MILITARY AFFILIATED STUDENTS**

UT Tyler honors the service and sacrifices of our military-affiliated students. If you are a student who is a veteran, on active duty, in the reserves or National Guard, or a military spouse or dependent, please stay in contact with your faculty member if any aspect of your present or prior service or family situation makes it difficult for you to fulfill the requirements of a course or creates disruption in your academic progress. It is important to make your faculty member aware of any complications as far in advance as possible. Your faculty member is willing to work with you and, if needed, put you in contact with university staff who are trained to assist you. The [Military and Veterans Success Center \(MVSC\)](#) has campus resources for military-affiliated students. The MVSC can be reached at [MVSC@uttyler.edu](mailto:MVSC@uttyler.edu) or via phone at 903.565.5972.

## **STUDENTS ON AN F-1 VISA**

To remain in compliance with Federal Regulations requirements you must do the following:

- Traditional face-to-face classes: Attend classes on the regular meeting days/times.
- Hybrid Classes: Attend all face-to-face classes convened by the instructor according to the schedule set for your specific course.
- Online course: Only one online course can count toward your full-time enrollment. Students are expected to be fully engaged and meet all requirements for the online course.

## **ACADEMIC HONESTY AND ACADEMIC MISCONDUCT**

The UT Tyler community comes together to pledge that "Honor and integrity will not allow me to lie, cheat, or steal, nor to accept the actions of those who do." Therefore, we enforce the [Student Conduct and Discipline policy](#) in the Student Manual Of Operating Procedures (Section 8).

## **FERPA**

UT Tyler follows the Family Educational Rights and Privacy Act (FERPA) as noted in [University Policy 5.2.3](#). The course instructor will follow all requirements to protect your confidential information.

## **ABSENCE FOR OFFICIAL UNIVERSITY EVENTS OR ACTIVITIES**

This course follows the practices related to [Excused Absences for University Events or Activities](#) as noted in the Catalog.

## **ABSENCE FOR RELIGIOUS HOLIDAYS**

This course follows the practices related to [Excused Absences for Religious Holy Days as noted in the Catalog](#).

## **ABSENCE FOR PREGNANT STUDENTS**

This course follows the requirements of Texas Laws SB 412, SB 459, SB 597/HB 1361 to meet the needs of pregnant and parenting students. Part of the supports afforded pregnant students includes excused absences. Faculty who are informed by a student of needing this support should make a referral to the Parenting Student Liaison. NOTE: Students must work with the Parenting Student Liaison in order to receive these supports. Students should reach out to the Parenting Student Liaison at [parents@uttyler.edu](mailto:parents@uttyler.edu) and also complete the [Pregnant and Parenting Self-Reporting Form](#).

## **CAMPUS CARRY**

We respect the right and privacy of students who are duly licensed to carry concealed weapons in this class. License holders are expected to behave responsibly and keep a handgun secure and concealed. More information is available at <http://www.uttyler.edu/about/campus-carry/index.php>.

