

Inorganic Chemistry 2 (21:160:413)

Fall 2021, Rutgers University-Newark

Instructor: Prof. Demyan Prokopchuk

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Class Time and Location: Mon/Wed 4:00 PM – 5:20 PM, Smith 240

Office Hours

Virtual: Tue/Thu 3:00 PM – 4:00 PM via Cisco WebEx. Anyone can join, no appointment required.

In-Person: Tue/Thu 2:00 PM – 3:00 PM, Life Sciences Center (LSC), Room 200. No appointment required, my office door will be open during this time.

Overview

This course will cover classical and modern aspects of coordination chemistry, bonding, and reactivity of transition metals and main group elements. Fundamental principles such as metal-ligand bonding, charge, spin state, and orbital analysis will be presented. The coordination of different ligand classes to transition metals will be covered, including reactivity trends. Particular emphasis will be placed on organometallic chemistry, small molecule activation, reaction mechanisms, and catalysis.

Lectures and Course Material

Everyone is expected to attend in-person lectures at the scheduled class times. If this is not possible due to situations beyond your control, please notify me as soon as possible. Lectures and all other course material (assignments, exams, grades) will be managed through Canvas. **Using smartphones and other electronic gadgets during class is unacceptable.**

Please remember that:

Lectures and materials utilized in this course, including but not limited to videocasts, podcasts, visual presentations, assessments, and assignments, are protected by United States copyright laws as well as Rutgers University policy. As the instructor of this course, I possess sole copyright ownership. You are permitted to take notes for personal use or to provide to a classmate also currently enrolled in this course. Under no other circumstances is distribution of recorded or written materials associated with this course permitted to any internet site or similar information-sharing platform without my express written consent. Doing so is a violation of the university's Academic Integrity Policy (<https://policies.rutgers.edu/sites/default/files/10.2.13%20-%20current.pdf>). Similarly, these copyright protections extend to original papers you produce for this course. In the event that I seek to share your work further, I will first obtain your written consent to do so.

Required Textbooks and Software

1. Catherine E. Housecroft and Alan G. Sharpe. *Inorganic Chemistry*, 5th Edition; Pearson, 2018. (4th Edition is nearly identical and also acceptable).
2. Cisco WebEx Meetings: <https://rutgers.webex.com>

Additional Resources

1. Jean, Y. *Molecular Orbitals of Transition Metal Complexes*; Oxford University Press, 2005. (digital version available through Rutgers Library)

Grading and Evaluation

Weighted Distribution		Grade Breakdown (%)
Assignments:	20%	A (85-100)
Quizzes:	10%	B+ (80-84)
Midterm:	30%	B (75-79)
Final Exam:	40%	C+ (70-74)
Total	100%	C (65-69)
		D (60-64)
		F (<60)

Assignments (20%)

Assignments (2 in total) will be related to subjects covered in class and in the relevant textbook chapters. Assignments must be **hand-written** and paper copies must be submitted **at the beginning of class** on the due date. Late submissions will be subject to a 10% penalty for every day past due (10 days late = 0%).

Quizzes (10%)

Short quizzes (25-30 min, 2 in total) will be held during the class period. The upcoming quiz will be announced one week beforehand. Makeup quizzes will **not** be allowed. Reviewing lecture materials and relevant book chapters will be very beneficial for quiz preparation.

Midterm (30%)

The midterm exam will be held during the regular class period. The exam will consist of questions that typically require a detailed written answer and/or some sketching (eg., MO diagrams, metal complexes, organic and inorganic compounds). A periodic table and any relevant formulas will be provided on the exam handout. **Makeup exams will not be allowed unless there is a legitimate written reason in accordance with University Policy.**

Final (40%)

The final exam will be held at the end of the semester and cover lecture material from the course (duration: 3 h). A periodic table and any relevant formulas will be provided on the exam handout.

Bonus Assignment (5%)

You can receive a bonus 5% on your final grade by submitting a Powerpoint presentation explaining a key concept learned in this course... *only using memes* (photos/gifs are acceptable). I am looking for creative and original submissions based on the lecture material that I've presented throughout the semester. Pick a subject (crystal field theory, spectrochemical series,

reaction mechanisms, etc...) and have fun! Bonus assignment can be submitted on Canvas any time **before the final exam**.

Important Dates

Last day to drop without “W” grade: **Sep. 8th, 2021**

Last day to drop course and receive “W” grade: **Oct. 25th, 2021**

Class Schedule

Date	Chapters*	Topics Covered
Sep 1, 8	19	<i>d</i> -Block Chemistry: General Considerations
Sep 13, 15	2, 5	Bonding and MO Theory
Sep 20, 22, 27, 29 Oct 4, 6	20	<i>d</i> -Block Chemistry: Coordination, Bonding, and Electronic Structure
Oct 11, 13	26	<i>d</i> -Block Chemistry: Reaction Mechanisms
Oct 18		Midterm Exam (1 h 20 min)
Oct 20, 25, 27 Nov 1, 3, 8	11, 12, 15, 23	Group 1, 2, 15 elements: selected topics; <i>s</i> - and <i>p</i> -block Organometallics
Nov 10, 15	8, 10	Redox chemistry and Hydrogen
Nov 17, 22, 29 Dec 1, 6, 8, 13	24, 25	<i>d</i> -block Organometallic Chemistry and Catalysis
TBD		Final Exam (3 h)

*Chapter numbers are the same for the 4th Edition.

Attendance and Academic Integrity Policy

Please review the Rutgers University Attendance Policy:

<https://policies.rutgers.edu/view-policies/academic—section-10>

As per the University’s Course Attendance policy (10.2.7), students are responsible for communicating with their instructors regarding absences. *As an academic community dedicated to the creation, dissemination, and application of knowledge, Rutgers University is committed to fostering an intellectual and ethical environment based on the principles of academic integrity. Academic integrity is essential to the success of the University’s educational and research missions, and violations of academic integrity constitute serious offenses against the entire academic community. The entire Academic Integrity Policy can be found at <http://academicintegrity.rutgers.edu/academic-integrity-policy>.* This policy applies to all Schools and Colleges of Rutgers, the State University of New Jersey, including the Ernest Mario School of Pharmacy and the Rutgers College of Nursing.

Special Accommodations

Rutgers University Newark (RU-N) is committed to the creation of an inclusive and safe-learning environment for all students and the University as a whole. RU-N has identified the following resources to further the mission of access and support:

For Individuals with Disabilities: The Office of Disability Services (ODS) is responsible for the determination of appropriate accommodations for students who encounter barriers due to

disability. Once a student has completed the ODS process (registration, initial appointment, and submitted documentation) and reasonable accommodations are determined to be necessary and appropriate, a Letter of Accommodation (LOA) will be provided. The LOA must be given to each course instructor by the student and followed up with a discussion. This should be done as early in the semester as possible as accommodations are not retroactive. More information can be found at ods.rutgers.edu. Contact ODS at (973)353-5375 or via email at ods@newark.rutgers.edu.

For Individuals who are Pregnant: The Office of Title IX and ADA Compliance is available to assist with any concerns or potential accommodations related to pregnancy. Students may contact the Office of Title IX and ADA Compliance at (973) 353-1906 or via email at TitleIX@newark.rutgers.edu.

For Absence Verification: The Office of the Dean of Students can provide assistance for absences related to religious observance, emergency or unavoidable conflict (e.g., illness, personal or family emergency, etc.). Students should refer to [University Policy 10.2.7](#) for information about expectations and responsibilities. The Office of the Dean of Students can be contacted by calling (973) 353-5063 or emailing deanofstudents@newark.rutgers.edu.

For Individuals with temporary conditions/injuries: The Office of the Dean of Students can assist students who are experiencing a temporary condition or injury (e.g., broken or sprained limbs, concussions, or recovery from surgery). Students experiencing a temporary condition or injury should submit a request using the following link: <https://temporaryconditions.rutgers.edu>.

For English as a Second Language (ESL): The Program in American Language Studies (PALS) can support students experiencing difficulty in courses due to English as a Second Language (ESL) and can be reached by emailing PALS@newark.rutgers.edu to discuss potential supports.

For Gender or Sex-Based Discrimination or Harassment: The Office of Title IX and ADA Compliance can assist students who are experiencing any form of gender or sex-based discrimination or harassment, including sexual assault, sexual harassment, relationship violence, or stalking. Students can report an incident to the Office of Title IX and ADA Compliance by calling (973) 353-1906 or emailing TitleIX@newark.rutgers.edu. Incidents may also be reported by using the following link: tinyurl.com/RUNReportingForm. For more information, students should refer to the University's Student Policy Prohibiting Sexual Harassment, Sexual Violence, Relationship Violence, Stalking and Related Misconduct located at <http://compliance.rutgers.edu/title-ix/about-title-ix/title-ix-policies/>.

For support related to interpersonal violence: The Office for Violence Prevention and Victim Assistance can provide any student with confidential support. The office is a **confidential resource** and does *not* have an obligation to report information to the University's Title IX Coordinator. Students can contact the office by calling (973) 353-1918 or emailing run.vpva@rutgers.edu. There is also a confidential text-based line available to students; students can text (973) 339-0734 for support.

For Crisis and Concerns: The Campus Awareness Response and Education (CARE) Team works with students in crisis to develop a support plan to address personal situations that might impact their academic performance. Students, faculty and staff may contact the CARE Team by using the following link: tinyurl.com/RUNCARE or emailing careteam@rutgers.edu.

For Stress, Worry, or Concerns about Well-being: The Counseling Center has confidential therapists available to support students. Students should reach out to the Counseling Center to schedule an appointment: counseling@newark.rutgers.edu or (973) 353-5805. If you are not quite ready to make an appointment with a therapist but are interested in self-help, check out *TAO at Rutgers-Newark* for an easy, web-based approach to self-care and support: <https://tinyurl.com/RUN-TAO>.

For emergencies, call 911 or contact Rutgers University Police Department (RUPD) by calling (973) 353-5111.