

Syllabus

Chem 520 B. ADVANCED INORG CHEM- Spring 2025

Instructor: Dr. Jing Gu

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Class Schedule: Tues. & Thurs. 12:30-1:45 pm, GMCS 327

Office Hours and Location: By appointment on Tues. or Thurs., Zoom or In-person at EIS 210

Textbooks:

Crabtree, Robert H. The Organometallic Chemistry of the Transition Metals, 4th Ed., John Wiley & Sons. 2005(ISBN-13: 978-0471662563).

Turro, Nicholas J. Modern Molecular Photochemistry. 1991 (ISBN-10: 0935702717)

Prerequisite

We will be building on some of the concepts you learned in Chem 520A.

Course Description: This course is intended for Chemistry, Materials Science, Physics, and Geology majors, and is designed to prepare students for further research in Inorganic Chemistry, Materials Science, Nanotechnology, Renewable Energy or, more generally, employment in physical or materials sciences fields. The course content will include advanced concepts in structure, bonding, and chemical/physical properties of inorganic compounds, understanding of which is central to the study of all areas of chemistry. The course will rely both on the books and literatures. Not all material in the text book will be covered and not all material covered will be found in the textbooks. Additional reading from primary literatures and presenting will be an integral part of this course. This course cannot be exhaustive in its coverage of organometallic chemistry but it is hoped that it will serve as a rational foundation of self-development in further studies.

Major topics will include:

- 1) Introduction to Current Inorganic Related Topics: Inorganic Materials, Renewable Energy, Catalysis, Nanotechnology, Functional Materials (length: 1 week)

- 2) Brief introduction of solid-state chemistry and Semiconductor photophysics and photovoltaic characterization (length: 1 week)
- 3) Coordination Compounds/Organometallics (including 18-electron rule, oxidation state, molecular orbital theory, Survey of Various Ligand Types, Elementary Organometallic Reactions) (length: 8-10 weeks)
- 4) History and Current Advanced Topics in Inorganics/Organometallics (length: 2 weeks)
- 5) Photochemical and Photophysical Properties of Organometallic Compounds (length: 2 weeks)

Expected Outcomes:

Upon completion of Chemistry 520B, students should be able to:

- Apply knowledge obtained in this class to problem-solving and critical thinking in the field of Inorganic Chemistry.
- Master Inorganic Chemistry concepts, knowledge, and histories.
- Understand the direction of future Inorganic Chemistry.
- Utilize knowledge gained from this class to perform logic thinking and utilize concepts and theories to predict the properties of common/general Inorganics/Organometallics.
- Grasp the advanced knowledge to characterize inorganic materials and organometallic molecules by physical and spectroscopic means, including UV-vis, fluorescent, and ultra-fast techniques etc.
- Develop the skill set necessary to continue on to further Inorganic Chemistry graduate Research.
- Through studying history of Organometallic Chemistry, demonstrate knowledge/awareness of issues of diversity/inclusion in the field.

Examinations and Points:

Attendance and class performance: 100 points

Presentations: 200 points

In-class quiz: 200 points

Homework: 200 points

Final Exam: 300 points

Total points: 1000 points (100%)

Grading: A: 90-100%, A⁻: 85-89%, B⁺: 80-85% B:75-79% B⁻:70-75% C: 60-69%, D: 50-59%, F<50%

Other useful course materials: peer-reviewed Journal papers in: the Journal of American Chemical Society; Inorganic Chemistry; Nature Materials; Energy & Environmental Science

I will teach primarily from the required text, with occasional use of the suggested text, as well as other texts, literature works, internet videos, etc.

Accommodations (SDS):

SDSU via the Student Disability Services (SDS) provides accommodations for students with documented disabilities or medical conditions covered under the Americans with Disabilities Act (ADA). In keeping with current public health guidance, no accommodations will be granted to students without an ADA-qualified disability or medical condition.

If you are a student with a disability and need accommodations for this class, please contact the Student Disability at sds@sdsu.edu as soon as possible. Accommodations are not retroactive; we cannot provide accommodations based upon disability until Dr Gu have received an accommodation letter from the Student Ability Success Center. SDS registration and accommodation approvals may take up to 10-14 business days, so please plan ahead.

Finding Help on Campus:

Need help finding help -- an advisor, tutoring, counselling, or emergency economic assistance? The SDSU Student Success Help Desk is here for you. Student assistants are available via Zoom Monday through Friday, 9:00 AM to 4:30 PM to help you find the office or service that can best assist with your particular questions or concerns.

Suggested: Consider adding a link to your college's Student Success Center or your department's tutoring center or supplementary instruction activities.

- CAL Student Success Center: <https://cal.sdsu.edu/academics/student-success>
- College of Education Student Success Center: <https://education.sdsu.edu/oss>
- Center for Student Success in Engineering: <https://csse.sdsu.edu/advising/advising>
- CoS Student Success Center: <https://cossuccess.sdsu.edu/>
- FSB Student Success Center: <https://business.sdsu.edu/undergrad/advising>
- HHS Advisors: <https://chhs.sdsu.edu/academics/advising>

- IVC Student Success and Retention: <https://imperialvalley.sdsu.edu/about/departments/student-affairs/retention>
- PSFA Advisors: https://psfa.sdsu.edu/resources/student_advisors

Math & Science Learning Center: <https://mslc.sdsu.edu/>

SDSU Economic Crisis Response Team:

If you or a friend are experiencing food or housing insecurity, technology concerns, or any unforeseen financial crisis, it is easy to get help! Visit sdsu.edu/ecrt for more information or to submit a request for assistance. SDSU's Economic Crisis Response Team (ECRT) aims to bridge the gap in resources for students experiencing immediate food, housing, or unforeseen financial crises that impacts student success. Using a holistic approach to well-being, ECRT supports students through crisis by leveraging a campus-wide collaboration that utilizes on and off-campus partnerships and provides direct referrals based on each student's unique circumstances. ECRT empowers students to identify and access long term, sustainable solutions in an effort to successfully graduate from SDSU. Within 24 to 72 hours of submitting a referral, students are contacted by the ECRT Coordinator and are quickly connected to the appropriate resources and services.

For students who need assistance accessing technology for their classes, visit our ECRT website (sdsu.edu/ecrt) to be connected with the SDSU library's technology checkout program. The technology checkout program is available to both SDSU and Imperial Valley students.

Land Acknowledgement:

We stand upon a land that carries the footsteps of millennia of Kumeyaay people. They are a people whose traditional lifeways intertwine with a worldview of earth and sky in a community of living beings. This land is part of a relationship that has nourished, healed, protected, and embraced the Kumeyaay people to the present day. It is part of a world view founded in the harmony of the cycles of the sky and balance in the forces of life. For the Kumeyaay, red and black represent the balance of those forces that provide for harmony within our bodies as well as the world around us. As students, faculty, staff and alumni of San Diego State University we acknowledge this legacy from the Kumeyaay. We promote this balance in life as we pursue our goals of knowledge and understanding. We find inspiration in the Kumeyaay spirit to open our minds and hearts. It is the legacy of the red and black. It is the land of the Kumeyaay.