

Fall 2023, **Chem 5020 Syllabus, Advanced Inorganic Chemistry** for Graduate Students, **3 credits**

Class days: **Tue & Thu, 9:30-10:45 am, Gilman 1801**

Office hrs: Tue & Thu 11:00 am-12 or by appointment in 2101E Hach

Prof. Javier Vela, PhD (Pronunciation~ Huh-vee-air veh-lah)

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Required* textbook: (* = tb-explained in class)

• **Weller, Overton, Rourke, Armstrong, *Inorganic Chemistry*, 7th Ed., Freeman, 2014 (ISBN 9780198768128)**

Other reference textbooks (**not** required):

- Shriver & Atkins, *Inorganic Chemistry*, 6th Ed., Freeman, 2014 (ISBN 1429299061) (prev. ed.)
- Miessler & Tarr, *Inorganic Chemistry*, 5th Ed., Pearson, 2014 (ISBN 01321811054)
- Ogden, *Introduction to Molecular Symmetry*, 1st Ed., Oxford, 2001 (ISBN 978-0198559108)
- Carter, *Molecular Symmetry and Group Theory*, Wiley, 1998 (ISBN: 0471149552)
- Ebsworth, Rankin & Cradock, *Structural Methods in I. C.*, 2nd Ed., CRC, 1991 (ISBN 0849377323)

ISU Course Catalog: "*Chem 5020. Advanced Inorganic Chemistry. (3-0) Cr. 3. F. Prereq: CHEM 301; CHEM 331 recommended. Chemistry of the main group (s, p) and transition (d, f) metals. Structure, bonding, electronic spectra, and reaction mechanisms. Aspects of organometallic, solid state, bioinorganic, and nano chemistry.*"

Class structure: Lecture plus in-class discussion. You are expected to read the appropriate textbook chapters in advance of each lecture. I may give additional materials and references as needed.

Topics to be covered:

- Atomic and molecular structure, bonding
- Symmetry
- Vibrational spectroscopy and molecular orbitals
- Coordination chemistry
- Electronic structure of d -metal complexes
- Reaction mechanisms
- Organometallic chemistry
- Catalysis
- Solid state chemistry (and nanomaterials)
- (Bioinorganic chemistry)

Grading composition (out of 100):

Exams (75): Two midterms = **25 each** (dates tbd), final = **25**; all exams are open book(s)/open resource(s);

Problem sets: **25**.

Optional project, worth up to a maximum of **10** extra points, for either:

- Developing of a nanochemistry lab demonstration based on a 5020-related topic, or
- creating (or expansion) of a Wikipedia article on a 5020-related topic (to be pre-approved by me, must explain a concept or idea to the general public/lay audience).

Grading scale: **A=100-95%, A⁻=94-90%, B⁺=89-86%, B=85-83%, B⁻=82-80%, C⁺=79-76%, C=75-73%, C⁻=72-70%, D⁺=69-66%, D=65-63%, D⁻=62-60%, F=59-0%**

Free Expression

Iowa State University supports and upholds the First Amendment protection of [freedom of speech](#) and the principle of [academic freedom](#) in order to foster a learning environment where open inquiry and the vigorous debate of a diversity of ideas are encouraged. Students will not be penalized for the content or viewpoints of their speech as long as student expression in a class context is germane to the subject matter of the class and conveyed in an appropriate manner.

Academic Dishonesty

The class will follow Iowa State University's policy on academic dishonesty. Anyone suspected of academic dishonesty will be reported to the [Dean of Students Office](#).

Accessibility

Iowa State University is committed to assuring that all educational activities are free from discrimination and harassment based on disability status. Students requesting accommodations for a documented disability are required to work directly with staff in Student Accessibility Services (SAS) to establish eligibility and learn about related processes before accommodations will be identified. After eligibility is established, SAS staff will create and issue a Notification Letter for each course listing approved reasonable accommodations. This document will be made available to the student and instructor either electronically or in hard-copy every semester. Students and instructors are encouraged to review contents of the Notification Letters as early in the semester as possible to identify a specific, timely plan to deliver/receive the indicated accommodations. Reasonable accommodations are not retroactive in nature and are not intended to be an unfair advantage. Additional information or assistance is available online at www.sas.dso.iastate.edu, by contacting SAS staff by email at accessibility@iastate.edu, or by calling 515-294-7220. Student Accessibility Services is a unit in the Dean of Students Office located at 1076 Student Services Building.

Face Masks: Anyone experiencing COVID or flu-like symptoms is encouraged—but not required—to wear a face mask.

Discrimination and Harassment

Iowa State University does not discriminate on the basis of race, color, age, ethnicity, religion, national origin, pregnancy, sexual orientation, gender identity, genetic information, sex, marital status, disability, or status as a U.S. Veteran. Inquiries regarding non-discrimination policies may be directed to Office of Equal Opportunity, 3410 Beardshear Hall, 515 Morrill Road, Ames, Iowa 50011, Tel. 515-294-7612, Hotline 515-294-1222, email eooffice@iastate.edu