SYLLABUS
Chemistry 312
Spring, 2019

INORGANIC CHEMISTRY

Instructor: Robert D. Pike
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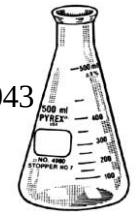

Office Hours:
Monday 1:30–3:00 pm
Thursday 9:00–10:30 am
(and by appointment)

Course Goals and Rationale: In this course we will reinforce and extend concepts first introduced in general chemistry and will explore bonding and reactivity in inorganic chemistry, including solid state structures, the chemistry of the elements, and an introduction to symmetry, and organometallic chemistry. The course is primarily intended for chemistry concentrators.

Texts:

1) G. L. Miessler, P. J. Fischer, and D. A. Tarr, Inorganic Chemistry, 5th ed.; Prentice Hall: Upper Saddle River, NJ, ISBN 978-0321811059 (2014).
2) Andy Weir, *The Martian*, Broadway Books, New York, NY, ISBN: 978-0553418026 (2014).

Lectures: Monday, Wednesday, Friday, 12:00–12:50 pm, Small Hall 111

Examinations: (20% for each of the higher scores, 10% for the lowest score)
February 25, March 22, April 19

All the material on exams relates to the course lectures/slides/handouts. The textbook is intended to supplement and amplify this material. *The Martian* material is treated in the problem sets, but is not specifically covered on any of the exams. Please let me know ASAP if you have accommodations from the SAS office. Students are expected to observe the College's honor code.

Make-up tests are not typically permitted. If you must miss an exam, please let me know at least one week in advance so that we can arrange for you to take the exam early.

Final Examination: (30%) In-class, closed-book, cumulative. May 6, 9:00 am–12:00 pm

Project: (10%) PowerPoint show (10–15 slides) on a topic of your choosing related to the wonders of chemistry, perhaps suggested from your reading in *The Martian*.

Problem Sets: (10%) Two types for each unit covered:
1) Practice end-of-chapter problems in text (not graded).
2) Hand-out problem sets, including questions associated with *The Martian* (graded).

Course Topics, Lecture Dates, Reading Assignments & Practice Problems:

Topic	Lecture Dates	Practice Problems in Miessler (optional)	Readings in *The Martian*
I. **Bonding** (2, 3, 6) Orbitals and the periodic table Covalent bonding: localized picture Covalent bonding: molecular orbitals Lewis acids & bases, hard/soft principle	1/16, 1/18, 1/23, 1/25, 1/28, 1/30, 2/1	**2**:15, 16, 17, 22, 23, 26, 27, 28, 29, 30, 33, 34, 35, 38, 42, 43, **3**:1, 3, 5, 8, 10, 17, 20, 41, **6**:3, 25	Chapters 1–5
II. **Structure** (7) States, phases and inter-particle forces Closest packing and metals Conduction and semi-conduction Ionic structures Defect structures	2/4, 2/6, 2/8, 2/11, 2/13, 2/15	**7**:2, 4, 5, 6, 7, 8, 9, 10, 12, 14, 21, 33	Chapters 6–10
EXAM 1	*2/25*	*Covers units I & II*	
III. **Main Group Chemistry** (8) Hydrogen Groups 1 and 2 Groups 13−17	2/18, 2/20, 2/22, 2/27, 3/1, 3/11, 3/13, 3/15, 3/18	**8**:1, 2, 20, 22, 24, 31, 32, 34, 36, 45	Chapters 11–14
EXAM 2	3/22	*Covers unit III*	
IV. **Symmetry** (4) Symmetry operations and point groups Dipole moment, chirality, and chemical equivalence Space group symmetry and X-ray crystallography	3/20, 3/25, 3/27, 3/29, 4/1	**4**: 4, 5, 20, 22, 23, 25, 33, 34	Chapters 15–18
V. **Transition Metals** (9, 10, 12) Oxidation states and ligands Coordination complexes Crystal field theory	4/3, 4/5, 4/8, 4/10, 4/12, 4/15	**9**:3, 7, 8, 12, 13, 27, **10**:1a-d, 3a,c,d, 8, 21, **12**:1, 5	Chapters 19–22
EXAM 3	4/19	*Covers units IV & V*	
VI. **Organometallic Chemistry** (13, 14) Metal carbonyls The 18-electron rule σ-Donor ligands π-Donor ligands 16-electron complexes, reactions, and catalysis	4/17, 4/22, 4/24, 4/26	**13**:1, 2, 3, 4, 6, 13, 35a-c, 40, 43, **14**:1a-e, 2a-d, 13, 20, 22, 23, 25	Chapters 23–26