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Fall 9-1-2015

### CHMY 401.01: Advanced Inorganic Chemistry

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**Goals:** This course will examine the coordination chemistry of metals with a focus on structure, bonding of ligands, electronic spectra and the role of metals in biological systems. Concepts in atomic structure, molecular symmetry, and molecular orbital theory will provide the underpinnings for developing an understanding of the chemistry of metals and how it contrasts with carbon-based chemistry.

**When:** Monday, Wednesday, and Friday from 3:10 to 4:00 pm, in Chem 102

**Instructor:** Bruce Bowler, Chem 310, x6114, [bruce.bowler@umontana.edu](mailto:bruce.bowler@umontana.edu)

**Office Hours:** Tuesday, Thursday, 3:10 to 4:00 pm, Chem 310, or by appointment

**Text:** Shriver and coauthors, Inorganic Chemistry, 6<sup>th</sup> ed., Freeman

**Text website:** [Inorganic Chemistry 6th edition website](#)

**Course website:** [Moodle](#)

**Evaluation:**

a) three 1-hour in-class exams – 100 points each	50% of grade
b) nine quizzes – 15 points each	20% of grade
c) 2-hour final exam – 200 points	30% of grade

**Course Content and Exam Date Overview:**

Topic	Text
Atomic Structure	Chap. 1
Simple Bonding Theories	Chap. 2.1-2.3
Symmetry and Group Theory	Chap. 6.1-6.5, 6.9
<b>Exam 1 (Friday, Oct. 2)</b>	
Molecular Orbitals	Chap. 2.4-2.11 and 6.6-6.10
Coord. Chem.: Structures & Thermodynamics	Chap. 7
<b>Exam 2 (Friday, Oct. 30)</b>	
Coord. Chem.: Bonding and Electronic Spectra	Chap. 20
Biological Inorganic Chemistry	Chap. 26
<b>Exam 3 (Friday, Dec. 4)</b>	
Biological Inorganic Chemistry	Chap. 26
Inorganic Chemistry in Medicine	Chap. 27
<b>Final Exam (Wednesday, Dec. 16, 1:10 - 3:10 pm, Chem 102)</b>	

## Course Notes:

- All quizzes are on Mondays. Quizzes (15 minutes) will be given at the **end** of class.
- Quizzes will test material covered since the previous quiz or exam.
- All Hour Exams are on Fridays. There is no quiz on the Monday following an hour exam.
- The Final Exam is comprehensive. It is on the Wednesday of Exam Period (Dec. 16, 2015)
- Suggested problems will be assigned weekly on Fridays. Homework problems are meant to reinforce lecture material. They will not be collected or graded. Answers to these problems are available in the Solutions Manual (available at the UM Bookstore).
- The course website is on Moodle. Login at: [Moodle Login](#). The course syllabus, lecture notes, practice exams, and answers to quizzes and exams will be provided on the web site.
- If you have a legitimate conflict with an exam date, you must inform the instructor **at least 1 week before** the exam to make alternate arrangements.
- Missed quizzes or exams will receive a grade of zero.
- The  $\pm$  grading system will be employed.
  - See the [Catalog for Academic Policies and Procedures](#) which includes grading policies
- See the [Student Conduct Code](#) for the definition and potential consequences of academic misconduct and plagiarism.
- Information on disability accommodations is available on the [University of Montana Accessibility Website](#).
- Last date to drop on CyberBear without a fee and with a refund is Monday, September 21, 2015 by 5:00 pm.
- Last date to drop without a petition is Monday, Nov. 2, 2015 at 5:00 pm. An add/drop form is required and a "W" will be assigned. After this date a signed petition must be obtained and a grade of WP or WF will be assigned. A fee of \$10 is assessed for each add/drop after September 21, 2015.
- Courses may not be dropped after Friday, December 11, 2015 at 5:00 pm. More details on add/drop policies are available in the [Important Dates and Deadlines PDF file](#) on the Registrar's website.

### Tentative Schedule

Month	Date	Day	Topic	Reading
<b>August</b>	31	M	Overview of Inorganic Chemistry	
<b>September</b>	2	W	Bohr atom, Heisenberg uncertainty, Schrödinger Eq.	1.1, 1.2
	4	F	Particle in a box, Quantum numbers	1.2, 1.3
	7	M	<b>Labor Day Holiday, no class</b>	
	9	W	Orbital shapes, Pauli exclusion, Shielding	1.3-1.5
	11	F	Periodic trends, Lewis theory	1.6, 1.7, 2.1, 2.2
	14	M	<b>Quiz 1</b> , VSEPR theory	2.3
	16	W	VSEPR theory, Symmetry and point groups	2.3, 6.1
	18	F	Symmetry and point groups	6.1
	21	M	<b>Quiz 2</b> ; Character tables	6.2
	23	W	Character tables	6.2
	25	F	Character tables	6.2
	28	M	<b>Quiz 3</b> ; Applications of symmetry	6.3-6.5
	30	W	Applications of symmetry	6.3-6.5, 6.9
<b>October</b>	2	F	<b>Hour Exam 1</b> (Chapters 1, 2.1-2.3, 6.1-6.5, 6.9)	
	5	M	Molecular Orbital theory,	2.4-2.7
	7	W	Homonuclear diatomic molecules	2.8
	9	F	Heteronuclear diatomics	2.9, 2.10
	12	M	<b>Quiz 4</b> ; Triatomic molecules	2.11
	14	W	Triatomic molecules	2.11
	16	F	Tetraatomic molecules	6.6-6.10
	19	M	<b>Quiz 5</b> ; Coordination chemistry, structure	7.1-7.6
	21	W	Coord. Chem., structure	7.1-7.6
	23	F	Coord. Chem., nomenclature	7.1-7.6
	26	M	<b>Quiz 6</b> ; Coord. Chem, isomers and thermodynamics	7.7-7.15
	28	W	Bonding, crystal field theory	20.1
	30	F	<b>Hour Exam 2</b> (Chapters 2.4-2.12, 6.6-6.10 and 7)	
<b>November</b>	2	M	Bonding, crystal field theory	20.1
	4	W	Bonding, crystal field theory	20.1
	6	F	Bonding, ligand field theory, octahedral complexes	20.2
	9	M	<b>Quiz 7</b> ; Bonding, ligand field theory, octahedral complexes	20.2
	11	W	<b>Veterans Day Holiday – no class</b>	
	13	F	Bonding, ligand field theory, 4 coordinate complexes	20.2
	16	M	<b>Quiz 8</b> ; Spectroscopy, Introduction	20.3
	18	W	Spectroscopy, term symbols	20.3
	20	F	Spectroscopy, correlation diagrams, selection rules, charge transfer bands	20.4-20.6
	23	M	<b>Quiz 9</b> ; Spectroscopy, Tanabe-Sugano diagrams	20.4
	25	W	<b>Thanksgiving Holiday, no class</b>	
	27	F	<b>Thanksgiving Holiday, no class</b>	
	30	M	Spectroscopy, Tanabe-Sugano diagrams	20.4
<b>December</b>	2	W	Biological Inorganic Chemistry	Ch 26
	4	F	<b>Hour Exam 3 (Chapter 20)</b>	
	7	M	Biological Inorganic Chemistry	Ch 26
	9	W	Biological Inorganic Chemistry	Ch 26
	11	F	Inorganic Chemistry in Medicine	Ch 27
	16	W	<b>Final exam</b> , 1:10 – 3:10 pm, Chem 102	