Ecampus SAMPLE SYLLABUS

NOTE to prospective students: This syllabus is intended to provide students who are considering taking this course an idea of what they will be learning. A more detailed syllabus will be available on the course Canvas site for enrolled students and may be more current than this sample syllabus.

CH 411
Inorganic Chemistry

Course Description
Fundamental principles of inorganic chemistry including atomic structure, bonding models for molecules and solids, symmetry, acid/base chemistry, oxidation-reduction, and metal-ligand complexes.

Prerequisites
One year of general chemistry. College-level physics is recommended.

Course Credits
This course combines approximately 90 hours of instruction, online activities, and assignments for 3 credits.

Technical Assistance
If you experience computer difficulties, need help downloading a browser or plug-in, assistance logging into the course, or if you experience any errors or problems while in your online course, contact the OSU Help Desk for assistance. You can call (541) 737-3474, email osuhelpdesk@oregonstate.edu or visit the OSU Computer Helpdesk online.

Learning Resources
- Inorganic Chemistry 6e (Shriver et al) (Required)
- Solutions Manual to accompany text (Optional)
- Worksheets, practice exams, lecture notes, and mini-lectures, assigned exercises and problems in the text. These will be provided on the class website.
- There may be other assigned or suggested readings and activities; these will be provided when needed.

Note to prospective students: Please check with the OSU Bookstore for up-to-date information for the term you enroll (OSU Bookstore Website or 800-595-0357). If you purchase course materials from other sources, be very careful to obtain the correct ISBN.

Canvas
This course will be delivered via Canvas where you will interact with your classmates and with your instructor. Within the course Canvas site you will access the learning materials, such as the syllabus, class discussions, assignments, projects, and quizzes. To preview how an online course works, visit the Ecampus Course Demo. For technical assistance, please visit Ecampus Technical Help.

Measurable Student Learning Outcomes
The course is designed to for students to analyze and integrate concepts relevant to inorganic chemistry (these are described in detail below) that are required to understand, read, write, and to perform research in inorganic chemistry.

Chapter 1
•Determine the energies of hydrogenic species, and determine relative energies of non-hydrogenic species using effective nuclear charges; give the electronic configuration of any atom or ion.
•Describe the radial and angular distribution of atomic orbitals.
•Provide definitions and methods of obtaining atomic radii, ionization enthalpies, electron affinities, electronegativities, and polarizabilities, and explain the periodic trends of these atomic properties.

Chapter 2
•Write a Lewis structure for any molecule, including resonance forms, and assign formal charges and oxidation states.
•Explain qualitatively the relation between bond order, strength, and length, and their trends in the p-block.
•Determine molecular geometries using VSEPR, including deviations from ideal geometries and relate orbital hybridization to common molecular geometries.
•Generate MO diagrams, symmetry labels, and electron configurations for any diatomic molecule, and describe bonding and spectroscopic properties.
•Write qualitative LCAO's for simple polyatomic molecules; explain and use correlation (Walsh) diagrams for polyatomic molecules.

Chapter 3
•Describe close-packed lattice in terms of A, B, and C hexagonal layers and describe the location, size, and concentration of Oh and Td voids in close packed lattices.
•Sketch and explain common metal and alloy structure types.
•Qualitatively indicate the relation between atomic radii and coordination number.
•Sketch, describe, and relate geometric relations for common ionic lattices, including rocksalt, rutile, sphalerite, wurtzite, fluorite, NiAs, CsCl, and perovskite.
•Define lattice enthalpy, and calculate using the Born-Meyer or Kapustinskii equations.
•Use the Born-Haber approach to estimate reaction enthalpies. Include entropic effects to predict reaction free energies.
•Discuss trends for thermal stabilities and solubilities using Born-Haber analysis.
•Draw and interpret simple DOS diagrams. Define and identify Fermi level, metals, insulators, instrinsic and extrinsic semiconductors. Relate the Arrhenius relation to electronic conduction in semiconductors.

Chapter 4
•Define Bronsted-Lowry acidity; identify B-L acids/bases and discuss the true nature of the acidicspecies (proton, hydronium, more complex) in aqueous solutions.

•Define, determine, and use Ka, Kb, Kw and pK values and list common strong and weak acids and bases.
•Explain solvent leveling and provide significant examples.
•Write equations and that generate polyoxoions and explain structures; use Pauling's rules to estimate Ka's for oxoacids.
•Use periodic and oxidation state trends to classify acidity or basicity of oxides.
•Define Lewis acidity, identify Lewis acids and bases and provide and explain examples of Lewis acid/base reactions for p-block elements.
•List common hard or soft Lewis acids/bases; provide and explain consequences of Lewis hard/soft reactions, use Drago-Wayland parameters to predict Lewis reactions and solvation.

Chapter 5
•Explain the use and significance of redox half-reactions. Determine potentials using a Latimer diagram.
•Add together half-reactions potentials and use the Nernst relation to determine the effect of pH on reaction potentials.
•Use Frost diagrams to predict disproportionation, comproportionation, oxidant/reductant strengths, and thermodynamic stabilities in aqueous solution.
•Use Pourbaix diagrams to identify stable species, and predict acid/base and redox reactions.
•Describe and provide examples of ligand effects on the stability of complexes.
•Interpret an Ellingham diagram to explain the reduction of metal ores.

Chapter 6
•Identify point symmetry operations and point groups and use symmetry rules to determine polarity, chirality, and ligand equivalence.
•Use character tables to generate orbital symmetry labels and predict spectroscopically-active vibrational modes.

Chapter 7, 20
•Give examples or identify complexes with coordination numbers 2, 3, 4, 5, and 6 and list common ligands.
•Name and give formulas for transition metal complexes according to IUPAC rules.
•Describe in detail the splitting of d-orbitals in Td, Oh, and square planar molecules using crystal field, ligand field, and MO models.

Chapter 8
•Describe qualitatively several techniques used to characterize inorganic compounds, including XRD, UV-Vis, IR and Raman, NMR and EPR, XPS, GC-MS, and thermal methods.
•Interpret and predict NMR spectra for inorganic compounds.

Chapter 10
•Describe the production and important uses of H2.
•Give examples of the structures or chemistry of molecular hydrides, saline hydrides and metallic hydrides.
•Explain hydrogen bonding and give important examples and consequences.

Evaluation of Student Performance

Course grades in CH411 will be based on required worksheet activities, one midterm exam, and a final exam.

Course Content

Topic	Text Chapter
Introduction	
Atomic Structure: Atomic orbitals, periodicity	1
Molecular Structure and Bonding: VSEPR, MO theory	2
Intro to Solids: Lattice geometries, common structures, lattice energies, Born-Haber, thermodynamic effects, band structures	3
Acids and Bases: Aqueous solutions, Lewis model, acid/base strengths	4
Oxidation and Reduction: Half reactions, Latimer, Frost, and Pourbaix diagrams, Nernst relations	5
Symmetry: Symmetry elements and operations, point groups, character tables, symmetry applications	6
Coordination Compounds: Structures of complexes, nomenclature, crystal and ligand field theories	7 20.1, 20.2
Characterization Methods: XRD, NMR, EPR, MS	8
Periodicity: Review of trends	9
Hydrogen: Preparation, uses, compounds, H-bonding	10

Course Policies

Proctored Exams

This course requires that you take exams under the supervision of an approved proctor. Proctoring guidelines and registration for proctored exams are available online through the Ecampus testing and proctoring website. It is important to submit your proctoring request as early as possible to avoid delays.

Guidelines for a Productive and Effective Online Classroom

Students are expected to conduct themselves in the course (e.g., on discussion boards, email) in compliance with the university's regulations regarding civility.

Civility is an essential ingredient for academic discourse. All communications for this course should be conducted constructively, civilly, and respectfully. Differences in beliefs, opinions, and approaches are to be expected. In all you say and do for this course, be professional. Please bring any communications you believe to be in violation of this class policy to the attention of your instructor.

Active interaction with peers and your instructor is essential to success in this online course, paying particular attention to the following:

- Unless indicated otherwise, please complete the readings and view other instructional materials for each week before participating in the discussion board.
- Read your posts carefully before submitting them.
- Be respectful of others and their opinions, valuing diversity in backgrounds, abilities, and experiences.
- Challenging the ideas held by others is an integral aspect of critical thinking and the academic process. Please word your responses carefully, and recognize that others are expected to challenge your ideas. A positive atmosphere of healthy debate is encouraged.

Statement Regarding Students with Disabilities
Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.

Accessibility of Course Materials
All materials used in this course are accessible. If you require accommodations please contact Disability Access Services (DAS).
Additionally, Canvas, the learning management system through which this course is offered, provides a vendor statement certifying how the platform is accessible to students with disabilities.

Expectations for Student Conduct
Student conduct is governed by the university's policies, as explained in the Student Conduct Code.

Academic Integrity
Students are expected to comply with all regulations pertaining to academic honesty. For further information, visit Student Conduct and Community Standards, or contact the office of Student Conduct and Mediation at 541-737-3656.

OAR 576-015-0020 (2) Academic or Scholarly Dishonesty:

a) Academic or Scholarly Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student's own efforts or the efforts of another.
b) It includes:
    i) CHEATING - use or attempted use of unauthorized materials, information or study aids, or an act of deceit by which a Student attempts to misrepresent mastery of academic effort or information. This includes but is not limited to unauthorized copying or collaboration on a test or assignment, using prohibited materials and texts, any misuse of an electronic device, or using any deceptive means to gain academic credit.
    ii) FABRICATION - falsification or invention of any information including but not limited to falsifying research, inventing or exaggerating data, or listing incorrect or fictitious references.
    iii) ASSISTING - helping another commit an act of academic dishonesty. This includes but is not limited to paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, taking a test/doing an assignment for someone else by any means, including misuse of an electronic device. It is a violation of Oregon state law to create and offer to sell part or all of an educational assignment to another person (ORS 165.114).
    iv) TAMPERING - altering or interfering with evaluation instruments or documents.
    v) PLAGIARISM - representing the words or ideas of another person or presenting someone else's words, ideas, artistry or data as one's own, or using one's own previously submitted work. Plagiarism includes but is not limited to copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project and then submitting it as one's own.

c) Academic Dishonesty cases are handled initially by the academic units, following the process outlined in the University's Academic Dishonesty Report Form, and will also be referred to SCCS for action under these rules.

Conduct in this Online Classroom

Students are expected to conduct themselves in the course (e.g., on discussion boards, email postings) in compliance with the university's regulations regarding civility.

OSU Student Evaluation of Teaching

Course evaluation results are extremely important and are used to help me improve this course and the learning experience of future students. Results from the 19 multiple choice questions are tabulated anonymously and go directly to instructors and department heads. Student comments on the open-ended questions are compiled and confidentially forwarded to each instructor, per OSU procedures. The online Student Evaluation of Teaching form will be available toward the end of each term, and you will be sent instructions via ONID by the Office of Academic Programs, Assessment, and Accreditation. You will log in to “Student Online Services” to respond to the online questionnaire. The results on the form are anonymous and are not tabulated until after grades are posted.