



This course supports the assessment for Inorganic Chemistry. The course covers 6 competencies and represents 3 competency units.

## Introduction

### Overview

This course introduces the concepts of inorganic chemistry—the branch of chemistry that studies the properties and behavior of any compound avoiding a specific focus on carbon. It will focus on the three most important areas of inorganic chemistry: the structure, properties, and reactions of various groups of inorganic compounds.

### Getting Started

Welcome to Inorganic Chemistry! The assessment for this course includes three tasks to demonstrate what you have learned about inorganic chemistry. Through successful completion of this course, you will show a high level of competence in the study of inorganic chemistry. You will be prepared to enter a secondary classroom and lead students in an organized and meaningful learning experience in their study of inorganic chemistry.

### Competencies

The course provides guidance to help you demonstrate the following 6 competencies:

- **Competency 208.3.1: Atomic Structure**  
The graduate analyzes atomic structure and can explain major principles and rules of atomic structure.
- **Competency 208.3.2: Periodic Trends**  
The graduate demonstrates that groups of elements possess similar physical and chemical properties and can determine trends using the periodic chart.
- **Competency 208.3.3: Bonding Models**  
The graduate demonstrates how atoms or ions in minerals are glued together by electrical bonds that are ionic or covalent and computes the bond order in a molecule.
- **Competency 208.3.4: Complex Ions and Coordination Compounds**  
The graduate demonstrates properties of compounds and constructs models of bonding compounds and complex ions.
- **Competency 208.3.5: Solid State**  
The graduate demonstrates the microscopic and macroscopic features of solids and demonstrates how crystallography informs solid state chemistry.
- **Competency 208.3.6: Material Chemistry**  
The graduate demonstrates how the structure of a material's molecules can determine its strength and uses.

### Teaching Dispositions Statement

Please review the [Statement of Teaching Dispositions](#)



## Course Instructor Assistance

For course instructor assistance, please schedule an appointment using the following link to the course instructor calendar:

- [Inorganic Chemistry CM Reservation Calendar](#)

You can also contact the CMs via this E-mail address:

- [chemistry@wgu.edu](mailto:chemistry@wgu.edu)

As you prepare to demonstrate competency in this subject, remember that course instructors stand ready to help you reach your educational goals. As subject matter experts, mentors enjoy and take pride in helping students become reflective learners, problem solvers, and critical thinkers. Course instructors are excited to hear from you and eager to work with you.

Successful students report that working with a course instructor is the key to their success. Course instructors are able to share tips on approaches, tools, and skills that can help you apply the content you're studying. They also provide guidance in assessment preparation strategies and troubleshoot areas of deficiency. Even if things don't work out on your first try, course instructors act as a support system to guide you through the revision process. You should expect to work with course instructors for the duration of your coursework, and you are encouraged to contact them as soon as you begin. Course instructors are fully committed to your success!

## Preparing for Success

The information in this section is provided to detail the resources available for you to use as you complete this course.

### Learning Resources

The learning resources listed in this section are required to complete the activities in this course.

#### Manually Enrolled Resources

You will need to manually enroll in or subscribe to learning resources as a part of this course.

Please check the "Learning Resources" tab and verify that you have access to the learning resources listed below. If you do not currently have access, please enroll or renew your enrollment at this time.

To enroll, navigate to the "Learning Resources" tab, click the "Sections" button, and then click the "Enroll Now" button for each resource. Once your mentor approves your enrollment in the resource, you will receive an e-mail with further access instructions. Contact your mentor if you have questions.

*Note. For instructions on how to enroll in or subscribe to learning resources through the*



"Learning Resources" tab, please see the ["Acquiring Your Learning Resources"](#) page.

## **Chemistry: Content Knowledge in OWL**

This web-based resource provides access to the following:

- Zumdahl, S., & Zumdahl, S. (2010). *Chemistry* (9th ed.). Belmont, CA: Brooks/Cole. ISBN: 1-133-61109-5
- End of Chapter (EOC) questions in the Zumdahl e-book
- Thinkwell videos
- Mastery questions in OWL (online learning resource)

After enrolling, you will receive an e-mail describing how to log in. After logging in, click the Assignments button. Complete the four "Intro" assignments to be sure your computer is compatible with this resource and you understand how to make use of this resource. The following 4-minute recording will help you navigate around OWL so you can find the Mastery questions and the reading assignments:

- [Using OWL v2 in Inorganic Chemistry](#)

## **Topics and Pacing**

This list suggests a weekly structure to pace your completion of the learning activities.

### **Unit 1:**

- Enroll in OWL
- Begin Learning Activities Task
- Learning Objectives:
  - History and Components of the Atom
  - Quantum Numbers and Electron Configurations

### **Unit 2:**

- Complete Learning Activities Task
- Learning Objectives:
  - Periodic Trends
  - Electronegativity, Polarity, and Ions

### **Unit 3:**

- Begin Transition Metal Task
- Learning Objectives:
  - Bond Energy
  - Lewis Structures and VSEPR Theory

### **Unit 4:**



- Continue Transition Metal Task
- Learning Objectives:
  - Coordination Chemistry
  - Crystal Field Theory

#### **Unit 5:**

- Complete Transition Metal Task
- Learning Objective:
  - Solid State Chemistry

#### **Unit 6:**

- Start Research Paper Task
- Learning Objective:
  - Material Chemistry
- Complete Research Paper Task

## **Inorganic Chemistry**

Inorganic chemistry covers the chemistry of metals. In this course, you will develop an understanding of how atomic structure affects the periodic trends and the bonding capabilities of metals. You will learn about metal behavior in complexes and in solids. You will also develop a better understanding of how inorganic chemistry plays an important role in your everyday life. You will complete three tasks in this course.

### **Start Learning Activities Task: Task 1**

For this task, you will be creating three learning activities in which you would engage students in learning concepts related to atomic structure and periodic trends. In addition to creating your learning activities, you will need to target your specific student population and assess their understanding of the material. Be sure to review the directions in Taskstream and the evaluation rubric.

**(Contact CMs with any questions)**

#### **Watch**

Review the following video:

- [Learning Activity Task Introduction](#)
- [Click here for a very useful resource about how to use the Condition, Behavior, Criterion method to write assessment objectives.](#)

### **History and Components of the Atom**

In previous chemistry courses, you likely learned about the discovery of the atom and its parts. In this section, you will review the different models of the atom that have been proposed throughout history.

**Read, Watch, Complete**



Read the following in Chapter 2 of the [Chemistry](#) e-text:

- sections 4-6

Watch the following Thinkwell videos on atomic structure:

- ["Determining Atomic Masses"](#) (12 min)
- ["Modern Atomic Structure"](#) (13 min)

Complete the OWL Mastery problems for:

- [Chapter 2: Mastery](#)

## Atomic Structure and Electron Configuration

In this section you will apply various quantum principles and concepts to identify the quantum numbers and orbital shapes for any given atom.

**Read, Watch, Complete**

Read the following in Chapter 7 of the [Chemistry](#) e-text:

- sections 1-9

Watch the following Thinkwell videos on atomic orbitals:

- ["Atomic Orbital Size"](#) (10 min)
- ["Atomic Orbital Shapes and Quantum Numbers"](#) (12 min)
- ["Atomic Orbital Energy"](#) (12 min)

Complete the OWL Mastery problems for:

- [Chapter 7: Mastery](#)

## Periodic Trends

Next, you will learn about periodic trends, or how atoms of the same group have similar properties. You will learn how these properties stem from the number and position of the valence electrons present in the atom. Understanding of periodic trends is crucial to understanding the behavior of atoms in chemical reactions and structure formations.

**Read, Watch, Complete**

Read the following in the [Chemistry](#) e-text:

- Chapter 2, section 7
- Chapter 7, sections 10-13

Watch the following Thinkwell videos on periodic trends:

- ["Periodic Relationships"](#) (11 min)



- ["Hydrogen, Alkali and Alkaline Earth Metals"](#) (15 min)
- ["Transition Metals and Nonmetals"](#) (13 min)

Complete the OWL Mastery problems for:

- [Chapter 2: Mastery](#)
- [Chapter 7: Mastery](#)

## **Electronegativity, Polarity, and Ions**

In this section you will continue to learn about periodic trends. Specifically, how electronegativity affects bonding, and how ion formation affects the atomic radius.

**Read, Watch, Complete**

Read the following in Chapter 8 of the [Chemistry](#) e-text:

- sections 1-4

Watch the following Thinkwell video on electron configurations and periodicity:

- ["Introduction to Electronegativity"](#) (5 min)

Complete the OWL Mastery problems for:

- [Chapter 8: Mastery](#)

## **Complete Learning Activities Task: Task 1**

Review the requirements for Task 1 and complete the task, focusing on the periodic trends. Make sure to pay close attention to the task requirements in TaskStream by reviewing the directions and the rubric for the task. Include information regarding each item in prompt A for each of the three activities.

## **Begin Transition Metal Task: Task 2**

Review the requirements for Task 2 in TaskStream. Read the directions carefully and make sure you understand what you need to do to complete the task. Access and review the task rubric for specific information on how the task will be evaluated, then review the learning resources listed below before beginning the task. Please contact your course instructor with any questions.

### **Review**

- [Inorganic Performace Task #2 Intro Video](#) (6 minutes)

## **Basics of Chemical Bonding**

In this section, you will learn about the fundamental principles of chemical bonding, reviewing how we represent covalent bonds (Lewis Structures), and discovering more about how we model covalent bonds in chemical compounds. Understanding chemical bonding is crucial to understanding coordination complexes, which is the focus of Task 2.



## Read, Watch, Complete

Read the following in Chapter 8 of the [Chemistry](#) e-text:

- sections 5-12

Watch the following Thinkwell videos on the fundamental concepts of Chemical Bonding:

- ["Valence Electrons and Chemical Bonding"](#) (8 min)
- ["Ionic Bonds"](#) (11 min)
- ["Resonance Structures"](#) (10 min)
- ["Formal Charge"](#) (12 min)
- ["Electronegativity, Formal Charge and Resonance"](#) (14 min)

Complete the OWL Mastery problems for:

- [Chapter 8: Mastery](#)

## Advanced Chemical Bonding

Next, you will interpret chemical structures and bonding using the Valence Shell Electron Pair Repulsion theory (VSEPR), Hybridization Theory and Molecular Orbital Theory.

### Read, Watch, Complete

Read the following in the [Chemistry](#) e-text:

- Chapter 8, sections 5-13
- Chapter 9, sections 1-3

Watch the following Thinkwell videos on Molecular Geometry and Bonding Theory:

- ["Using VSEPR Theory"](#) (15 min)
- ["An Introduction to Hybrid Orbitals"](#) (14 min)
- ["Pi Bonds"](#) (8 min)
- ["Molecular Orbital Theory"](#) (13 min)
- ["Applications of Molecular Orbital Theory"](#) (14 min)

Complete the OWL Mastery problems for:

- [Chapter 8: Mastery](#)
- [Chapter 9: Mastery](#)

Information from this section will be crucial for understanding structures formed in coordination chemistry

## Coordination Chemistry

In this section, you will apply your knowledge of bonding models to transition metals and learn how transition metal ions behave when in solutions. You will learn about ligands and how they



form complexes with transition metal ions to form coordination complexes.

**Read, Watch, Complete**

Read the following in Chapter 21 of the [Chemistry](#) e-text:

- sections 1–4

Read the following article on the Chemwiki web page, from UC Davis:

- [24.3: The 18-electron Rule](#)

Watch the following Thinkwell videos on coordination compounds:

- ["Complexes and Ligands"](#) (12 min.)
- ["Naming Coordination Compounds"](#) (8 min.)
- ["Structure of Coordination Compounds and Isomers"](#) (15 min.)

Complete the OWL Mastery problems for:

- [Chapter 21: Mastery](#)

## Crystal Field Theory

Now, you will explore the crystal field theory. Studying this theory will provide you with an understanding of the different properties (color, magnetism, etc.) of the same transition metal ion in different coordination complexes.

**Read, Watch, Complete**

Read the following in Chapter 21 of the [Chemistry](#) e-text:

- sections 21.5-21.6

Watch the following Thinkwell videos:

- ["Color and Transition Metals"](#) (8 min.)
- ["Crystal Field Theory"](#) (13 min.)
- ["Ligand Field Theory"](#) (14 min.)

Complete the OWL Mastery problems:

- [Chapter 21: Mastery](#)

## Solid State Chemistry

In this section, you will learn about the solid structure of metals. There are many types of solid structures that can be formed by metals and you will learn about them and about how they are modelled using the principles of crystallography.

**Read, Watch, Complete, Review**





Read the following in Chapter 10 of the [Chemistry](#) e-text:

- sections 10.3-10.4

Watch the following Thinkwell videos:

- "[Types of Solids](#)" (13 min.)
- "[Crystal Structure](#)" (14 min.)
- "[Crystal Packing](#)" (11 min.)

Complete the OWL Mastery problems for:

- [Chapter 10: Mastery](#)

## **Complete Transition Metal Task: Task 2**

Review the requirements and rubric for Task 2 in TaskStream. Be careful to complete all of the requirements for this task. The learning resources listed below will be helpful with completing this task successfully.

## **Begin Research Paper Task**

Review the requirements and rubric for Task 3 in TaskStream. Be careful to complete all of the requirements for this task. The learning resources listed below will be helpful with completing this task successfully.

**(Contact CMs with any questions)**

**Review, Watch, Use**

Review the following:

- [Inorganic Chemistry Research Paper Performance Task Introduction](#)
- [Possible Inorganic Research Paper Topics](#)

This is not an exhaustive list and you are welcome to choose a compound not found here.

Watch the following course instructor videos:

- "[Reading Review Articles](#)" (5 min.)
- "[Reading Research Papers](#)" (5 min.)

Use [The WGU Library](#) in your research. You must use at least three peer reviewed resources.



## Materials Chemistry

In this final section, you will read some examples of how chemical compounds can be used in various ways and how their molecular structure leads to their useful properties. This will be useful in your completion of Task 3, where you need to discuss how the atomic/molecular level of structure of a material leads to its macroscopic physical properties.

### Read

Read the following web page articles:

- [Ceramics: Ceramics possess features of both ionic compounds and covalent network solids, resulting a wide range of useful properties.](#)
- [Hemoglobin: This metalloprotein has the ability to bind both oxygen and carbon dioxide to enable metabolism.](#)
- [Semiconductor LEDs: These materials have revolutionized the lighting and display industries.](#)

## Complete Research Paper Task: Task 3

In TaskStream, carefully read the directions and requirements for Task 3. Make sure you understand what you need to do to complete the task. Access and review the task rubric for specific information on how the task will be evaluated.

## Final Steps

Congratulations on completing the activities in this course! This course has prepared you to complete the assessment associated with this course. If you have not already been directed to complete it, schedule and complete the assessment now.

## Accessibility Policy

Western Governors University recognizes and fulfills its obligations under the Americans with Disabilities Act of 1990 (ADA), the Rehabilitation Act of 1973 and similar state laws. Western Governors University is committed to provide reasonable accommodation(s) to qualified disabled learners in University programs and activities as is required by applicable law(s). The Office of Student Accessibility Services serves as the principal point of contact for students seeking accommodations and can be contacted at [ADASupport@wgu.edu](mailto:ADASupport@wgu.edu).

## Course Feedback

WGU values your input! Please submit any feedback you have using the following form:

[Course Feedback](#)