



Norfolk State University Department of Chemistry  
Advanced Inorganic Chemistry: CHM 473-01 – 3 credit hour  
Syllabus and Course Policies Spring 2023

Section: 473 - 01

Class Meetings: MW 1 – 2:30 pm

Room: WSB 211

Instructor: Dr. Lauren E. VanGelder

Email: levangelder@nsu.edu

Office: WSB 326F

Office Hours: My weekly availability can be viewed through the scheduling tool Calendly.

To meet with me, you must schedule an appointment: [Calendly.com/DrVanGelder](https://calendly.com/DrVanGelder)

### Course Description

This course is an introduction to modern inorganic chemistry. Topics include principles of structure, bonding, and chemical reactivity with application to compounds of the main group and transition elements, including organometallic chemistry.

### Pre-requisite

CHM 231, 232, 331, & 332 (or CHM 221, 222, 321, & 322)

### Pre/Co-requisite:

CHM 361

### Course Rationale

Inorganic chemistry plays a key role in the science of materials, catalysis, biological processes, nanotechnology, and other multi-disciplinary fields. If organic chemistry is defined as the chemistry of hydrocarbon compounds and their derivatives, inorganic chemistry can be described broadly as the chemistry of “everything else.” This includes all the remaining elements in the periodic table, as well as carbon, which plays a major and growing role in inorganic chemistry. The large field of organometallic chemistry bridges both areas by considering compounds containing metal–carbon bonds; it also includes catalysis of many organic reactions. Bioinorganic chemistry bridges biochemistry and inorganic chemistry and has an important focus on medical applications. Environmental chemistry includes the study of both inorganic and organic compounds. In short, the inorganic realm is vast, providing essentially limitless areas for investigation and potential practical applications.

### Course General Objectives and Learning Outcomes

The major goals to be achieved by students in this course are understand the molecular structures and properties of inorganic complexes and compounds. We will study concepts in bonding, trends in periodic properties, molecular symmetry and its relationship to spectra, solid-state, reaction mechanisms, coordination chemistry, and descriptive chemistry of selected elements.

### Course Materials

Inorganic chemistry is an extremely broad field of study. As such, there is no single definitive text that covers all topics in this course. The following texts will be referenced throughout the course, and select readings and images will be provided to supplement your lecture notes. Both texts are provided to you at no cost through Blackboard.

*Inorganic Chemistry (5<sup>th</sup> Edition)*; by Gary L Meissler, Paul J. Fischer, and Donald A. Tarr

*Principles of Inorganic Chemistry (2<sup>nd</sup> Edition)*; by Brian W. Pfennig

**Grading Scale:**

91 – 100 = A	73 – 75 = C+
87 – 90 = A–	70 – 72 = C
83 – 86 = B+	65 – 69 = C– (failing)
80 – 82 = B	60 – 64 = D (failing)
76 – 79 = B–	<60 = F (failing)

**Grade Distribution:**

Your grade will be calculated based on the following distribution:

Problem Sets:	15%
Quizzes:	35%
Exams:	50%

**Problem Sets:**

Problem sets pertaining to the content covered in class will be assigned throughout the semester. These assignments may be worked on collaboratively, but each student must submit their own work, representative of their own understanding. Problem sets will be assigned due dates based on course progress. No late work will be accepted.

Problem sets will be graded for completion only. Immediately after the assignment due date, a detailed answer key will be posted. It is each student's responsibility to check their own work for accuracy, and to correct any errors.

While not all questions on each problem set will be graded for correctness, the content will be assessed on quizzes and exams. Your goal should be to fully understand the process of solving each problem, rather than to just get the correct answer.

**Quizzes:**

Short quizzes will be given in class approximately once per week throughout the semester. Quizzes will assess mastery of topics covered in class and on problem sets.

**Exams:**

Three exams will be given in-class during the semester. On dates when an exam is scheduled, the exam will fill the entire class period. Due to the number of seniors enrolled in this course, there is no Final Exam.

**Exam Dates:**

**Exam 1 – Monday 2/20**

**Exam 2 – Monday 3/27**

**Exam 3 – Wednesday 4/26**

**Absence/Late work/Make-up policies.**

**Class attendance policy** – Class attendance is not part of your grade. However, students who do not attend class typically do not pass this course. Regardless of reason, if you will be absent from class, it is your responsibility to catch up on any course content that you missed so that you do not fall behind.

**Problem Set Late Policy** – Late homework is not accepted for any reason. You can earn partial credit for partially completed work submitted on time.

**Quiz and Exam Make-up Policy** – Quiz and exam make-ups are only given in the most extenuating circumstances. Students may request the opportunity to make up a missed quiz or exam only if the instructor is notified of the reason for the request within 24 hours of the exam date, **and** if proper excuse from the Dean of Students is submitted within three business days of the absence. The instructor reserves the right to deny the opportunity for any make-up quiz or exam

## Course Topics:

- **Atomic Structure.** Spectra and orbitals, ionization energy, electron affinity, shielding and effective nuclear charge.
- **Covalent Molecular Substances.** Geometries (symmetry point groups), valence bond theory (hybridization,  $\sigma$ ,  $\pi$ ,  $\delta$  bonds), molecular orbital theory (homo and heteronuclear diatomics, multi-centered MO, electron-deficient molecules,  $\pi$ -donor and acceptor ligands), acid-base chemistry.
- **Main Group Elements.** Synthesis, structure, physical properties, variations in bonding motifs, acid-base character, and reactivities of the elements and their compounds.
- **Transition Elements and Coordination Chemistry.** Ligands, coordination number, stereochemistry, bonding motifs, nomenclature; ligand field and molecular orbital theories, Jahn-Teller effects, magnetic properties, electronic spectroscopy (term symbols and spectrochemical series)

### *Time permitting:*

- **Solid State Materials.** Close packing in metals and metal compounds, metallic bonding, band theory, magnetic properties, conductivity, semiconductors, insulators, and defects.
- **Organometallic Chemistry.** Metal carbonyls, hydrocarbon and carbocyclic ligands, 18-electron rule (saturation and unsaturation), synthesis and properties, patterns of reactivity (substitution, oxidative addition and reductive elimination, insertion and de-insertion, nucleophilic attack on ligands, isomerization, transmetallation, stereochemical nonrigidity).

## **NSU Policies and Required Information**

### **Statement on Face Mask Requirement**

Protecting the health and safety of our community is every member's responsibility. Therefore, properly worn face masks that cover both the nose and mouth are required prior to entry into all academic areas, including classrooms, labs, studios, centers, and departmental suites. Students who are unable to wear a face mask due to medical reasons should contact the Office of Accessibility Services and International Student Services (O.A.S.I.S.) at 757-823-8325 to initiate the request for special accommodation. Notification to instructors of approved accommodations should be submitted in writing prior to the first-class session (or as soon thereafter as possible). Students who attempt to enter a classroom without wearing masks will be asked by the instructor to wear masks prior to entry. Accordingly, no eating or drinking will be allowed in class. Students who do not comply with a request by an instructor to wear a mask and have not made an accommodation request through O.A.S.I.S. will be asked to leave class and may be subject to disciplinary actions.

### **NSU Counseling Center Information**

Here at the Counseling Center we are sensitive to addressing the mental health and overall wellbeing of the student population. The Counseling Center will be providing services in the form of individual therapy by telehealth platform, brief supportive services and consultation, case management follow-up, and referral support via phone. This may include providing coping strategies, sharing additional health and wellness resources, and other relevant support. Students may contact the Counseling Center by calling (757)-823-8173 between the hours of 8:00 am and 5:00 pm to request to make an appointment.

As always, **crisis** services after hours and weekends are available by calling (757) 823-8102 if the student is located on campus or live in the state of Virginia. The **National Suicide Hotline** at 1-800-273-8255 is available to students who live out of state that experience a crisis. For a life-threatening emergency, call **911** right away.

For online accessible resources please visit the Counseling Centers website <https://www.nsu.edu/counselingcenter>. Students may access Uline through the NSU website <http://www.ulifeline.org/NSU/> for an anonymous, confidential, online resource, where students can search for information regarding emotional health. The site also includes a self-screening tool, information about mental/emotional disorders, and how to obtain help for oneself or others.

### **Attendance Policy**

The University expects students to attend all classes. While unnecessary absences are discouraged, the University recognizes that on occasion, students may have legitimate reasons to be absent from class such as representing the University in activities, illnesses, or personal emergencies. If you are absent when a quiz or test is given, you must present documentation from the Office of Students Affairs to the instructor and make arrangements before the next class meeting.

### **University's Sponsored Event**

If you will be absent when an exam will be given, you must make arrangements (email the detailed information regarding the excuse) with the instructor **before** the event. Obtain a detailed schedule of events from your event director so that you can notify your instructor promptly. It is your responsibility to inform the instructor of your need in time for proper arrangements. Coming to the instructor after the event without prior arrangements constitutes an unexcused absence.

### **DO NOT MISS YOUR FINAL EXAM:**

NO make-up of Final Exam or No Extra Credit will be given.

The FINAL EXAM schedule has been made by the university and cannot be changed by the instructor; therefore, do not make any travel arrangements that will cause you to be *absent* from the Final Exam.

The Final Exam **cannot** be administered early or late regardless of the reason.

### **Class Enrollment**

According to University policy, you are not properly enrolled in the class if your name is not on the class roster. You will not receive a grade for the course if your name is not on the class roster. Students are not permitted to remain in classes for which they are not registered. It is the responsibility of the student to report to the registrar any corrections needed regarding his/her name on the roster.

### **Incomplete Policy**

Students will not be given an incomplete grade in the course without sound reason and documented evidence as described in the Student Handbook. In any case, for a student to receive an incomplete, he or she must have a passing grade for midterm (C or above) and must have completed a significant portion of the course.

## **Americans with Disabilities Act (ADA) Statement**

In accordance with Section 504 of the 1973 Rehabilitation Act and the Americans with Disabilities Act (ADA) of 1990 we ask if you have a disability or think you have a disability, please contact the Office of Accessibility Services/International Student Services (O.A.S.I.S.)

Contact Information:

Coordinator: Mrs. Doral Jackson

Accessibility Services (O.A.S.I.S.)

Location: James A Bowser Building, Suite 121

Telephone: 757-823-2009

Fax: 757-823-2640

## **Honor Code**

Students are expected to uphold the school's standard of conduct relating to academic honesty. Students assume full responsibility for the content and integrity of the academic work they submit. The guiding principle of academic integrity shall be that a student's submitted work, examinations, reports, and projects must be that of the student's own work. Students shall be guilty of violating the honor code if they:

1. Represent the work of others as their own.
2. Use or obtain unauthorized assistance in any academic work.
3. Give unauthorized assistance to other students.
4. Modify, without instructor approval, an examination, paper, record, or report for the purpose of obtaining additional credit.
5. Misrepresent the content of submitted work.

The penalty for violating the honor code is severe. Any student violating the honor code is subject to receive a failing grade for the course and will be reported to the Office of Student Affairs. If a student is unclear about whether a particular situation may constitute an honor code violation, the student should meet with the instructor to discuss the situation.

## **University Assessment Statement**

As part of NSU's commitment to provide the environment and resources needed for success, students may be required to participate in a number of university-wide assessment activities. The activities may include tests, surveys, focus groups and interviews, and portfolio reviews. The primary purpose of the assessment activities is to determine the extent to which the university's programs and services maintain a high level of quality and meet the needs of students. Students will not be identified in the analysis of results. Unless indicated otherwise by the instructor, results from the University assessment activities will not be computed in student grades.

## **Student Conduct in Class Policy**

Any acts of classroom disruption that go beyond the normal rights of students to question and discuss with instructors the educational process relative to subject content will not be tolerated, in accordance with the Academic Code of Conduct described in the Student Handbook. Cellular phones, pagers, CD players, radios, and similar devices are prohibited. Proper attire for classroom is required.

## **Statement on Recordings**

We will use technology for virtual meetings and recordings in this course. Our use of such technology is governed by FERPA, the Acceptable Use of Technological Resources Policy, and Student Code of Conduct. A record of all meetings and recordings—regardless of platform—is kept and stored by Blackboard/Medial in accordance with the Acceptable Use of Technological Resources Policy and FERPA. Your instructor will not share recordings of your class activities except with course participants, including fellow students, TAs, GAs, Mentors, guest faculty or community partners or NSU personnel when deemed appropriate. Students may not record virtual meetings on their own. Students may not share recordings outside of this course. Doing so may result in disciplinary action.

## **Syllabus Change Policy**

This syllabus is a guide and every attempt is made to provide an accurate overview of the course. However, circumstances and events may make it necessary for the instructor to modify the syllabus during the semester and may depend, in part, on the progress, needs, and experiences of the students. The instructor will give notice when changes to the syllabus are made.