

# CHM6620/4611 – ADVANCED INORGANIC CHEMISTRY I

FALL 2019

## INSTRUCTOR INFORMATION

Instructor	Email	Office Phone	Office Location
Keith Searles	<a href="mailto:k.searles@ufl.edu">k.searles@ufl.edu</a>	+1 (352) 392-0326	SIS 428A

## GENERAL INFORMATION

### MEETING TIMES

This course will meet **Tuesday** and **Thursday** periods 2-3 (8:30 am – 10:25 am) in **FLI 0109**.

### OFFICE HOURS

Office hours will be held after class or by appointment.

### DESCRIPTION

CHM6620/4611, a three-credit course, will cover concepts of modern inorganic/organometallic chemistry. The aim of this course is to provide all enrolled students with knowledge of advanced inorganic chemistry concepts, focusing on the understanding of structure and reactivity. This will cover topics of group theory, molecular orbital theory, bonding in transition metal complexes, and chemical reactivity. Students will utilize concepts presented during the course in problem solving situations and for the evaluation and understanding of the primary literature.

### OVERVIEW OF TOPICS

#### Atomic and Molecular Structure

- Schrödinger equation and solutions
- Electronic configurations
- Lewis structures
- Valence shell electron-pair repulsion

#### Symmetry and Group Theory

- Symmetry operations
- Point groups
- Character tables
- Reducible and irreducible representations

#### Molecular Orbital Diagrams

- Diatomic molecules
- Hybridization and 2<sup>nd</sup> order mixing
- Heterodiatomics and small molecules
- Transition metal complexes
- Walsh diagrams

## Transition Metal Complexes

- Ligand types and classes
- Metal-ligand multiple bonds
- Extended M.O. considerations
- Ligand field theory and crystal field theory
- Isolobal analogy

## Reaction Mechanisms

- Elementary reaction steps
- Acid-base chemistry
- Catalytic cycles
- M.O. considerations

## Heterogeneous Chemistry and Catalysis

- Heterogeneous catalytic processes
- Classes of heterogeneous catalysts
- Heterogenized homogenous catalysts

## COURSE MATERIALS

### TEXTBOOK

Required Text: Miessler, G. L. and Tarr, D. A., *Inorganic Chemistry 5<sup>th</sup> Edition*

Useful References: Cotton, A. F., *Chemical Applications of Group Theory 3<sup>rd</sup> Edition*

Albright, T. A., Burdett, J. K., Whangbo, M. H., *Orbital Interactions in Chemistry*

Gispert, J. R., *Coordination Chemistry*

*Students will also be directed to the primary literature for useful references*

## GRADE DISTRIBUTION

### ASSIGNMENTS

The following assignments will be administered during the course:

Assignment	Weight
Problem Sets (ca. 10)	10 %
Quizzes (ca. 10)	10 %
Oral Presentation	15 %
Mid-term Exams (2)	35 %
Cumulative Final Exam	30 %

### PROBLEM SETS

Problem sets will be assigned based on topics discussed during the duration of the course. Problem sets will be graded based on a scale of 0, 1, 2, or 3. A grade of 3 represents a problem set where all questions were answered with a general understanding of the material. A grade of 2 represents an incomplete problem set

or a partial lack of understanding the material. A grade of 1 represents an incorrect problem set. A grade of 0 represents a problem set which was not attempted.

## QUIZZES

Quizzes will be administered during the course meeting times and will not be announced prior to their administration. The lowest quiz grade will be dropped. No make-up quizzes will be given.

## ORAL PRESENTATIONS

An oral presentation will be given by each member of the course focusing on an individual who has made a significant contribution to the field of inorganic chemistry. The aim of the assignment is to familiarize the class with past and current inorganic chemists who are leaders in the field. Oral presentations will consist of a 15 minutes presentation highlighting the key contributions of an individual to the inorganic community followed by 5 minutes of questions/discussions. In addition to the presentation, active participation in the question/discussion sessions will contribute to your grade. Oral presentations will be given on the final days of the course.

## EXAMS

Two mid-term exams will be given:  
Thursday Oct. 3<sup>rd</sup> (8:30 am - 10:25 am)  
Tuesday Nov. 12<sup>th</sup> (8:30 am - 10:25 am)

## FINAL EXAM

The final exam will be given Tuesday, Dec. 11<sup>th</sup> (3:00 pm - 5:00 pm). The final exam will be cumulative and include material from the oral presentations given during the semester.

## QUIZ/EXAM QUESTION DISPUTES

If you believe you have found an error on a quiz/exam or would like to dispute a question, the deadline for requesting a regrade is within 1 week of receiving a graded quiz/exam.

## ATTENDANCE, EXTENSION REQUESTS

Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found at: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

## UNIVERSITY POLICIES

### UNIVERSITY POLICY ON ACCOMMODATING STUDENTS WITH DISABILITIES

Students requesting accommodation for disabilities must first register with the Dean of Students Office (<http://www.dso.ufl.edu/drc/>). The Dean of Students Office will provide documentation to the student who must then provide this documentation to the instructor when requesting accommodation. You must submit this documentation prior to submitting assignments or taking quizzes or exams. Accommodations are not retroactive, therefore, students should contact the office as soon as possible in the term for which they are seeking accommodations.

## UNIVERSITY POLICY ON ACADEMIC MISCONDUCT

As a student at the University of Florida, you have committed yourself to uphold the Honor Code, which includes the following pledge: “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.” You are expected to exhibit behavior consistent with this commitment to the UF academic community, and on all work submitted for credit at the University of Florida. The following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” It is assumed that you will complete all work independently in each course unless the instructor provides explicit permission for you to collaborate on course tasks (e.g. assignments, papers, quizzes, exams). Furthermore, as part of your obligation to uphold the Honor Code, you should report any condition that facilitates academic misconduct to appropriate personnel. It is your individual responsibility to know and comply with all university policies and procedures regarding academic integrity and the Student Honor Code. Violations of the Honor Code at the University of Florida will not be tolerated. Violations will be reported to the Dean of Students Office for consideration of disciplinary action. For more information regarding the Student Honor Code, please see: <http://www.dso.ufl.edu/SCCR/honorcodes/honorcode.php>.”

## U MATTER, WE CARE

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing Staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

## FEEDBACK

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

## NETIQUETTE

All members of the class are expected to follow rules of common courtesy in all email messages, threaded discussions, and chats. <http://teach.ufl.edu/wp-content/uploads/2012/08/NetiquetteGuideforOnlineCourses.pdf>

## GETTING HELP

For issues with or technical difficulties with Canvas, contact the UF Help Desk: <https://lss.at.ufl.edu/help.shtml>; (352)-392-HELP.

Other resources are available at <http://www.distance.ufl.edu/getting-help> for Counseling and Wellness resources, disability resources, resources for handling student concerns and complaints, and library desk support.

## DISCLAIMER

This syllabus represents my current plans and objectives for the course. As we go through the semester, those plans may need to change to enhance the class learning opportunity. Such changes, which will be communicated clearly, are not unusual and should be expected.