CHEM 6172 Syllabus

Physical Methods – Inorganic Chemistry, Section A, 3 Credits
Fall 2026

Instructor Information

Instructor	**Email**
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General Course Information

Description

An introduction to the use of physical methods in inorganic chemistry including vibrational spectroscopy, electronic absorption spectroscopy, electronic structure theories, magnetometry, and electron paramagnetic resonance.

Course Learning Outcomes

Upon successful completion of this course, you should be able to:

- Apply molecular symmetry and molecular orbital theory to determine the bonding in molecular complexes
- Use these tools to assign and understand molecular spectroscopy (IR, Raman, Mossbauer, Electronic Absorption, EPR, X-ray Absorption)
- And use these tools to evaluate the electronic structure and magnetism of coordination complexes

Required Course Materials

Course Texts
Drago: Physical Methods in Chemistry
Ballhausen and Gray: Introduction to Ligand Field Theory
Additional Materials/Resources
Cotton: Chemical Applications of Group Theory
Figgis and Hitchman: Ligand Field Theory and its Applications
Nakamoto: Infrared and Raman Spectra of Inorganic and Coordination Compounds
Carlin: Magnetochemistry
Kettle: Symmetry and Structure, Readable Group Theory for Chemists
Albright, Burdett, and Whangbo: Orbital Interactions in Chemistry

Grading Policy:

Assignment	**Date**	**Weight (Percentage, points, etc)**
Problem Sets (5)	See Course Schedule for dates	40%
Take-Home Exams (2)	Due 10/21 and 11/18	30% (or 40%)

Assignment	Date	Weight (Percentage, points, etc)
Oral Evaluation (1)	To be scheduled in the Exam Period	30% (or 20%) If your take home-exams are higher grades than the oral evaluation they will be worth more, and vice-versa.

Description of Graded Components

Problem Sets:
All problem sets must be completed to pass this class. They will be graded on a pass/fail basis. These are due at the beginning of class on the dates indicated on the course schedule.
Take-Home Exams:
All exams must be completed to pass this class. Exams must reflect individual effort. These are due at the beginning of class on the dates indicated on the course schedule.
Oral Evaluation:
All students must complete an oral evaluation. These will be scheduled for the exam period. These will be based on student understanding of two papers provided near the beginning of the term and build on the analysis developed in the course and throughout the problem sets. More details about the rubric and expectations will be provided at a later date.
Exam and Homework Policy:
You are *strongly* encouraged to work with your classmates on both the HW and exams. You may use any books or electronic resources you wish to complete them (except for previous exams or problem sets from CHEM6172 or CHEM6170), but ***the work you submit should be your own***.
Grading Scale
Your final grade will be assigned as a letter grade according to the following scale:

A	90-100%
B	79-89%
C	67-78%
D	54-66%
F	0-53%

USG Required Course Policies

Attendance and/or Participation

Attendance is required. All lectures/class time will be videotaped and available at the conclusion of the class session (asynchronously). I will also provide copies of slides and/or lecture notes for the day. However, participating in discussion of the topics and working with your classmates is essential for success. Please ask questions virtually by email (preferred) or via Canvas and set up times to work together either in-person or virtually.

Academic Integrity

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review Georgia Tech's Honor Code and the student Code of Conduct.

Any student suspected of cheating or plagiarism on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Additional Georgia Tech Required Policies

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services (404-894-2563) as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Student-Faculty Expectations Agreement

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Student-Faculty Expectations articulate some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.

Pre- &/or Co-Requisites

The course assumes basic knowledge of quantum mechanics and completion of a rigorous undergraduate inorganic chemistry course (GT equivalent, CHEM3111). Depending the student's goals concurrent enrollment in CHEM3111 or CHEM6170 could suffice. Please discuss your background and goals with the instructor for advice on whether you have sufficient background for this course.

Collaboration, Group Work, and Use of Generative AI

[The university's Honor Code gives you the job of defining for your students the levels of collaboration that are permitted, as well what outside resources they are permitted to use (on assignments, exams, projects, etc.), and how they are supposed to report their use of those outside resources. You may also choose whether or not and to what extent students may collaborate with Generative AI in their course work. CTL provides guidance and some adaptable template syllabus statements for use of GenAI in this webresource on Establishing Course Policies. Articulate your policy here.]

Extensions, Late Assignments, & Re-Scheduled/Missed Exams

Extensions for problem sets are possible up to the point that delays interfere with class progress. It is my goal to return problem sets to the class and provide feedback during class no more than 2 classes after the problem set is due (e.g. if it was due on a Tuesday class, I will return and discuss it no later than the following Tuesday). No penalty for late PS will be assessed as long as I have not yet returned and discussed that PS. Further delays will not be graded and receive a fail (but must be turned in order to complete the class). For the take-home exams, no extensions are possible (unless for medically excused absence or other officially excused absence) since these are meant to be group activities. **Please check the course schedule NOW and compare with your course requirements in other classes**. Over the first two weeks adjustment of the schedule with the consent of the class and myself *may be* possible. However, in the case that no mutually acceptable alternate can be identified, the original dates in the syllabus will hold.

Recordings of Class Sessions and Required Permissions

Class sessions will be recorded (video with audio) as long as the room has appropriate equipment. Class recordings, lectures, and other classroom presentations presented through video conferencing and other materials posted on Canvas are for the sole purpose of educating the students enrolled in the course. Students may not make their own recordings or share recordings, including screen capture, unless the instructor states so or individual permission is obtained.

Graduate Student Academic and Professional Success Resources: A list of resources for graduate students is given on the Office of Graduate and Postdoctoral Education website. Specific information for current graduate students includes

- Academic Resources such as the Communications Center, Language Institute, Library, Catalog, Registrar, resources for conducting research, Advocacy and Conflict Resolution resources, and how to manage unexpected situations that may impact your academic performance;

- Student Resources such as Campus Services, Child Care/Family programs, Health & Wellness, Career Services, and the Student Resource Guide; and
- Professional Development such as the programming from the Career Center and other professional development resources and events"]