

Ch 112 – Course Information 2016-2017

Tues/Thurs 9:00-10:25am (Noyes 147)

<http://agapie.caltech.edu/#classes>

Instructor:

Prof. Theodor Agapie

Office: Noyes 314, E-mail: agapie@caltech.edu

Teaching Assistants:

Chris Reed (creed@caltech.edu, x3682, Noyes 316)

Ryan Ribson (rribson@caltech.edu, x3682, Noyes 316)

Textbook (recommended, not required):

Inorganic Chemistry, Miessler, Fischer and Tarr. *Symmetry and Spectroscopy*, Harris and Bertolucci. Lectures will cover all material you are responsible for on exams.

Problem sets (6): 16% of total grade

Weekly problem sets will be available on-line on Friday morning and will be due on the following Thursday, at the start of class. Each problem set will be graded on a 0-10 scale, in whole point increments. Graded problem sets *will not* be corrected in detail, so cross-check your worked problems with the solutions that are made available. **Note:** Late problem sets will receive no credit.

Project: 12%

Written summary on a current topic in inorganic chemistry (~60%) and a section (~40%) on a new direction / proposal of original research if you were to work in the area of the project (4 pages not including references, JACS format). Due on Nov 22. Abstract (1%) due on Oct 13. Topic selection (three choices) due on Oct 6.

Paper critique: 4%

Each student will select a paper from recent literature (2015-2016; from JACS, *Angewandte*, *Science*, *Nature*) focused on an aspect related to your selected project topic. See below on format of critique. Due on Oct 13.

Presentation: 8% (including class participation)

Lecture time in the last two weeks will be reserved for student oral presentations of the projects. Time limit for presentation is 10 minutes; practice being concise! Prepare no more than 8 slides, not including title slide (5 on background, 3 on the proposed new direction). Students in the audience are expected to participate with questions and comments. Turn in the slides to the TAs as a pdf file by noon on presentation day.

Exams:

Midterm (30%), final (30%). Closed book, take-home. *Consultation of test materials from previous years is not allowed.*

Office Hours:

TAs: Tuesday, 2-3 pm; Wednesday, 8-9 pm (Noyes 317)

Instructor: Flexible, by appointment

Course topics

Experience is assumed with molecular symmetry, assignment of oxidation states, electron counting. Ample opportunities will be provided for practice.

- Molecular symmetry; matrix representations; character tables
- Electronic structure of π systems and their interactions with transition metals; projection operator
- Binding and activation of small molecules: N_2 , CO , O_2 , CO_2
- Metal-element (nitrides, carbides, oxos) and metal-metal multiple bonding
- Electronic absorption spectroscopy
- Electronic states
- Symmetry in chemical reactivity

Paper Critique: Critical evaluation of a published paper

- Brief summary of major findings and conclusions
- Significance: importance of questions being addressed
- Approach: are the methods appropriate to answer the questions?
- Innovation
- Data: quality and reliability
- Conclusions: do the data adequately support the conclusions; are there reasonable alternative interpretations?
- Do the results challenge existing interpretations or support accepted concepts?
- Do the results develop new concepts, point to new research directions or to new paradigms?

Turn in 0.5-1 page written critique (12 pt Arial, single space)

Due Dates:

- PS1 Oct 6
- Critique/Abstract Oct 13
- PS2 Oct 20
- PS3 Oct 27
- Midterm Nov 3
- PS4 Nov 10
- PS5 Nov 17
- Report Nov 22
- PS6 Dec 1
- Presentations Nov 22, Nov 29, Dec 1
- Final Dec 8