Ch 112 – Course Information 2017-2018
Tues/Thurs 9:00-10:25am (Noyes 147)
http://agapie.caltech.edu/#classes

Instructors:
Prof. Theodor Agapie
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Teaching Assistants:
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Angela Shiau (ashiau@caltech.edu, x3682, Noyes 304)

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 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 20. Abstract (1%) due on Oct 18. Topic selection (three choices) due on Oct 11.

Paper critique: 4%
Each student will select a paper from recent literature (2016-2017; from JACS, Angewandte, Science, Nature) focused on an aspect related to your selected project topic. See below on format of critique. Due on Oct 18.

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 9 minutes; practice being concise! Prepare no more than 6 slides (4 on background, 2 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 10 pm the day before the presentation.

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

Office Hours:
TAs: Tuesday, 8-9 pm; Wednesday, 8-9 pm (TBD)
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 11
- Critique/Abstract Oct 18
- PS2 Oct 25
- PS3 Nov 1
- Midterm Nov 8
- PS4 Nov 15
- Report Nov 20
- PS5 Nov 29
- PS6 Dec 6
- Presentations Dec 4 and Dec 6
- Final Dec 13