

East Tennessee State University
Special Topics in Inorganic Chemistry (CHEM 4957/5957-200)
Inorganic Photochemistry

Spring 2017, 7:00 pm – 8:30 pm MW, 476 Brown Hall

Professor: Dr. Catherine McCusker

Telephone: 423-439-4306

Office hours: Tu: 1 pm – 2 pm

W: 11:30 am – 1 pm

Other times available by appointment

463 Brown Hall

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Course Description & Objectives:

This class will be divided into two halves. In the first half of the semester we will discuss the physical principles involved in the absorption of light and the photophysical and photochemical processes which may occur after light absorption. In the second half of the semester we will use classic and modern literature examples to explore applications of photophysical and photochemical reactions in inorganic chemistry.

The objectives are for students to:

- Understand the theoretical principles controlling the rate and probability of light absorption and subsequent photophysical and photochemical reactions.
- Become familiar with possible photophysical and photochemical processes and how they may be experimentally probed.
- Explore the applications of photochemistry in modern inorganic chemistry.
- Improve scientific presentation skills.

D2L Site

A Desire2Learn (D2L) site (<http://elearn.etsu.edu>) for this course is available. All reading assignments, homework assignments, handouts, etc. will be posted to the site.

Required Text:

- N. J. Turro, V. Rammamurthy, and J. C. Scaiano. *Principles of Modern Photochemistry: An Introduction*, ISBN: 978-1891389573

Additional Useful Resources:

Many of these books are available from the ETSU library.

- A. Vincent. *Molecular Symmetry and Group Theory: A Programmed Introduction to Chemical Applications, 2nd Edition*. ISBN: 978-0471489399
- F. A. Cotton. *Chemical Applications of Group Theory, 3rd Edition*. ISBN: 978-0471510949
- Drago, R.S. *Physical Methods for Chemists, 2nd Edition*, ISBN: 978-0030751769
- Harris, D.C. and Bertolucci, M. D. *Symmetry and Spectroscopy: An Introduction to Vibrational and Electronic Spectroscopy*. ISBN: 978-0486661445
- J. R. Lakowicz. *Principles of Fluorescence Spectroscopy, 3rd Edition*. ISBN: 9780387312781
- V. Balzani, P. Ceroni, A. Juris. *Photochemistry and Photophysics: Concepts, Research, Applications*. ISBN: 978-3-527-33479-7

- M. Montalti, A. Credi, L. Prodi, and M. T. Gandolfi. *The Handbook of Photochemistry*, 3rd Edition ISBN: 978-0824723774

Course Policy:

- Attendance – Attendance for this lecture is not mandatory, but highly recommended. You will be responsible for all material covered during every lecture, regardless of whether it is covered in the assigned readings.
- Classroom – Be respectful of your fellow students and keep your phones and other electronic devices put away during class. Any distractive behavior (including the use of electronic devices) will result in a warning the first time and by dismissal for the remainder of the class period the second time (please refer to the college catalog for the classroom misconduct policy).
- Make up – There is **NO** make-up of exams for unexcused absences, makeups will only be allowed in the case of an excused absence due to University sponsored event, research related trip, illness, or other documented reason. In the case of planned absences, the student will be responsible for scheduling a time to take the exam early. In the case of unexpected absences, the student is responsible for notifying the professor as soon as possible and arranging a time to take the exam within one week of the scheduled exam time. For all excused absences, the student is responsible for providing documentation. For scheduled events this documentation must be provided two weeks before the absence and for unscheduled absences this documentation must be provided within one week of the absence.
- Academic Integrity – Cheating in class is a serious offence and will not be tolerated. As stated on the ETSU website: *“Plagiarism, cheating, and other forms of academic dishonesty are prohibited. Students guilty of academic misconduct, either directly or indirectly through participation or assistance, are immediately responsible to the instructor of the class. In addition to other possible disciplinary sanctions which may be imposed through the university’s academic misconduct policy as a result of academic misconduct, the instructor has the authority to assign an “F” or a zero (“0”) for the exercise or examination, or to assign an “F” in the course..”* The possession of an unapproved electronic device during an exam constitutes Academic Misconduct. Any incident of academic misconduct will result in a minimum grade of 0 on the assignment and will be reported. All students should read the full academic integrity policy. (<http://www.etsu.edu/academicintegrity/default.aspx>).
- Disability Accommodations – It is the policy of ETSU to accommodate students with disabilities, pursuant to federal law, state law and the University’s commitment to equal educational access. Any student with a disability who needs accommodations, for example arrangement for examinations or seating placement, should inform the instructor at the beginning of the course. Faculty accommodation forms are provided to students through Disability Services in the D.P.Culp center, telephone 439-8346.
- **Mental Health:** Students often have questions about mental health resources, whether for themselves or a friend or family member. There are many resources available on the ETSU Campus, including: ETSU Counseling Center (423) 439-4841; ETSU Behavioral Health & Wellness Clinic (423) 439-7777; ETSU Community Counseling Clinic: (423) 439-4187.
 - **If you or a friend are in immediate crisis, call 911.**
 - Available 24 hours per day is the National Suicide Prevention Lifeline: 1-800-273-TALK (8255).

Assignments:

Reading Assignments:

The reading assignments for the course will consist of both selections from the textbook and provided research articles. It will be expected, especially for literature discussions, that you will have read the assigned material before class.

Exams:

55% of total grade

There will be two exams during the semester (15% each), and a cumulative take-home final exam (25%). The exams will be mainly focused on applying the concepts discussed in lecture to solving problems, and not merely regurgitating memorized facts.

Literature Presentations:

20% of total grade

Over the course of the semester each student will be assigned two literature articles. For each article students will be responsible for presenting the material contained in the article to the class in the form of a 20 minute presentation followed by a 5-10 minute discussion period with the audience.

Homework Assignments:

15% of total grade

Periodic homework assignments will also be given, aimed at helping you apply the concepts discussed in lecture. These assignments are primarily a tool to help prepare you for exams and help me gauge the class's understanding of the material. Detailed answer keys will be provided after the homework due date. Late homework will not be accepted after the answer key is posted.

Class Participation:

10% of total grade

Discussions of relevant literature will be incorporated into the class. Students will be expected to have read the assigned article before class and to actively participate in the discussion during class. In-class activities and problem sets will also be included in the class participation category.

Grading:

Your grade in the class will be determined by the overall percentage of total points you earn. At the end of the semester a scaling factor will be applied (if necessary) to ensure the highest grades in the class are A's. For borderline scores, positive factors such as regular class attendance, asking and answering questions in class, or seeking extra help as needed will also be considered when assigning a letter grade.

A = 90 – 100%

B+ = 80 – 85.5%

C = 65 – 69.5%

A- = 86 – 89.5%

B = 75 – 79.5%

F = < 64.5%

B- = 70 – 74.5%

Exam Dates:

March 1

April 19

May 5 (Final Exam Due)

Course Topics:

A more detailed schedule of class topics and reading assignments is available on D2L. The applications covered will (partially) depend on class interest.

- *Molecular Symmetry and Spectroscopic Selection Rules*
- *Absorption of Light and Formation of Excited States*
- *Radiative and Non-Radiative Decay of Excited States*
- *Photophysical and Photochemical Reactions of Excited States*
- *Applications of Inorganic Photochemistry*