

Chemistry 532, Fall 2024: Molecular Photochemistry and Photophysics

Lecture = 11:00 MWF, 307 SGM, broadcast live over Zoom, available on-line

Office Hour: arrange a time to meet with me

Prof: Mark Thompson; met@usc.edu

Chem. 532 will cover topics related to the photochemistry and photophysics of molecular materials. The emphasis will be on organic compounds, but we will spend some time discussing how metal atoms of organometallic and coordination complexes change things. We will start with a general overview of atomic and molecular electronic structure. This course is by no means a course in quantum mechanics, but we will use some of the conclusions of quantum mechanics to understand photophysical and photochemical processes. We will start with a description of the excited state and then discuss radiative and nonradiative transitions between states and what governs their probability. We will discuss electron and energy transfer between molecules. Lastly, we will finish with a discussion of optoelectronic devices, such as photovoltaics and light emitting devices made from molecular and polymeric materials.

Recommended

Preparation: A general understanding of structure and bonding is expected. It is recommended that students have taken Chem 515, Chem 526 or a similar course.

Text: Turro, Ramamurthy and Scaiano, "Principles of Molecular Photochemistry: an Introduction" (ISBN: 978-1-891398-57-3)

Supplem. Texts: Balzani, Ceroni and Juris, "Photochemistry and Photophysics: Concepts, Research, Applications" (ISBN: 978-3-527-33479-7)

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Grading: Homework: 20%
Midterm: 35%
Final: 45%

	Topics	Readings and Homework (Chapters from Turro)	Due Dates (Home work to be handed out on Fridays, due in one week)
Week 1	Overview of molecular photochemistry and photophysics, review of atomic theory	Chapter 1	No homework due week 1
Week 2	Excited state properties: electronic, vibrational and spin	Chapter 2	Homework due Friday week 2
Week 3	Photophysical processes	Chapter 2 and 3	Homework due Friday week 3
Week 4	Transitions between states	Chapter 3	Homework due Friday week 4
Week 5	Radiative transitions between electronic states	Chapter 4	Homework due Friday week 5 Midterm in week 5
Week 6	Radiationless transitions	Chapter 5	Homework due Friday week 6
Week 7	Energy and electron transfer	Chapter 7	Homework due Friday week 7
FINAL	All	All	December 9, 2022, 11:00-1:00

Statement on Academic Conduct and Support Systems

Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu> or to the *Department of Public Safety* <http://adminopsnet.usc.edu/department/department-public-safety>. This is important for the safety of the whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage <http://sarc.usc.edu> describes reporting options and other resources.

Support Systems

A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.