CEM 988 US17

Introduction to Nonlinear Spectroscopy, Fall Semester 2017

Warren Beck
3 Chemistry, 3-1137
beck@chemistry.msu.edu

Course Description

This course will provide an introduction to the theory for nonlinear spectroscopy with applications to condensed phase and biophysical systems. The goal is to provide the student with enough theory to start research projects in femtosecond spectroscopy. Diagrammatic methods will be introduced that allow an initial understanding especially of third-order spectroscopy, including pump-probe and two-dimensional experiments.

Schedule

Lectures: start 30 August 2017

Course Outline

1. linear and nonlinear spectroscopy; spectroscopic line shapes
2. density matrix: coherences and populations
3. diagrammatic methods: double-sided Feynman diagrams, Albrecht WMEL
4. experiments: linear absorption, SHG, third-order (pump-probe, 2D)
5. numerical simulations using the multimode Brownian oscillator model
6. student projects

Course Materials

Peter Hamm and Martin Zanni, *Concepts and Methods of 2D Infrared Spectroscopy*. Cambridge University Press, 2011.

Purchase of the text by Hamm and Zanni is suggested but not required; it provides background and an introductory coverage of much of the course outline.

Additional materials will be made available at the course's D2L website.

Course Grade and Rules

This course will be presented in an informal, group-meeting style. The course grade will be determined by the quality of a student's contributions to the discussions (50%) and by a presentation at the end of the semester (50%).

Accessibility. Michigan State University is committed to providing equal opportunity for participation in all programs, services, and activities. Requests for accommodations by persons with disabilities may be made by contacting the Resource Center for Persons with Disabilities by phone at 517-884-RCPD or through the web at https://www.rcpd.msu.edu/. Once your eligibility for an accommodation has been determined, you will be issued a verified individual services accommodation ("VISA") form. Please present this form to the instructor at the start of the semester and/or at least a week prior to the accommodation date (test, final exam, homework, etc.). Requests received after this date will be honored whenever possible.