

Chm 544: Theory and Techniques of Biophysics and Biophysical Chemistry
call # 8370

Meeting time: TTh 1:15 PM-2:35 PM,

Auditorium: Chemistry, Room B18

Instructors:

Alexander Shekhtman

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Office hour: TTH 2:45-3:45PM

Igor Lednev

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Office hour: FRI 10:30-11:30 AM

Michael Carpenter

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Office hour: TTh 3-4pm

This course is designed to give foundation of spectroscopic techniques widely used in chemistry and biochemistry for characterization of bio-organic and inorganic compounds. This is a **very challenging course**, which will require preliminary knowledge of physical chemistry and quantum mechanics. In return, students will gain understanding of the extremely useful analytical techniques. Instructors Shekhtman, Lednev and Carpenter want every graduate student to do well in this course.

This course consists of two lecture periods per week. A tentative lecture schedule is given at the end of this syllabus.

Texts: The recommended text for the NMR section of this course is Spin Dynamics. Basics of Nuclear Magnetic Resonance by Malcolm H. Levitt. You should be able to purchase it at the University Bookstore or on amazon.com http://www.amazon.com/exec/obidos/tg/detail/-/0471489220/qid=1104353284/sr=8-1/ref=sr_8_xs_ap_il_xgl14/102-0929067-5367368?v=glance&s=books&n=507846.

The recommended textbook for Fluorescence Spectroscopy section is Molecular Fluorescence: Principles and Applications by Bernard Valeur.

Raman spectroscopy section will have handouts and possibly text.

Lectures: Students are expected to attend the lectures. The material presented on the lectures will focus student's attention on the most important topics and cannot be substituted by reading a textbook.

Homework: There will be homework assigned after each week, which will be counted towards 10 % of the grade for the course.

Examinations: Examinations will include questions similar to the homework and will be related to anything presented during lectures, whether that information is in the text or not. The final examination is given Fri May 06 2005, from 1:30 to 3:00 PM.

Grading: Letter Grades will be assigned by the instructor based on the overall average, on equivalent of 90 points of exams plus 10 points for the homework. Each hour exam is counted as 30 points and the final is 30 points, the one lowest exam equivalent is dropped. Grading is absolute.

Date	instructor	material presented
Jan 20	AS	Spin in electromagnetic field
Jan 25	AS	One pulse experiment
Jan 27	AS	NMR spectrometer
Feb 1	AS	Spin systems in liquids
Feb 3	AS	Product Operator Formalism
Feb 8	AS	FT-NMR
Feb 10	AS	COSY Experiment
Feb 15	AS	NOESY experiment
Feb 17	AS	Exam #1
Feb 24	MC	Absorption of Uv-vis light
March 1	MC	Characteristics of fluorescence emission
March 3	MC	Intermolecular photophysical processes
March 8	MC	Fluorescence polarization, emission anisotropy
March 10	MC	Resonance energy transfer
March 15	MC	Principles of fluorometric techniques
March 17	MC	Fluorescent molecular sensors
March 29	MC	Advanced Techniques
March 31	MC	Exam #2
Apr 5	IL	Basic concepts and classical Raman theory
Apr 7	IL	Basic concepts and classical Raman theory
Apr 12	IL	Quantum mechanical approach
Apr 14	IL	Quantum mechanical approach
Apr 19	IL	Polarization properties of Raman scattering
Apr 21	IL	Experimental Raman spectroscopy
Apr 26	IL	Biological applications
Apr 28	IL	Exam# 3
May 6		Final exam