Chem 286: NMR methodology course syllabus instructor: Monika Ivancic

Lab component

January 18	course overview; lab structure & schedule labs NMR spectrometer: magnet, console, computer, probe		
Jan 23 & **25**	NMR active nuclei, principles behind NMR (how and why it works) Principles behind NMR: E-levels, Boltzmann distribution	**lab 1:**	^{1}H 1D on Bruker & using MNova
Jan 30 & **Feb 1**	The vector model of NMR: rotating frame, the pulse & QPD		
February 6 & 8	The vector model (cont'd): phase cycling, Nyquist & sampling the FID Recording the spectrum: time and frequency domains		
Feb 13 & **15**	Practical aspects of ^{13}C NMR NOE enhancement vs. Polarization Transfer (DEPT, INEPT)	**lab 2:**	^{13}C 1D & DEPT on Bruker
February 22	Chemical shifts and coupling Electron shielding; origin of spin-spin coupling		
Feb 27 & **Mar 1**	X-nuclei NMR and kinetics by NMR	**lab 3:**	^{19}F & ^{31}P 1D on Bruker
March 6 & 8	**Midterm exam** T1 & T2 relaxation; Mechanisms of relaxation		

March 20 & **22**	Review of calibrating the 90^{o} pulse Intro to 2D NMR; Homo vs. heteronuclear experiments	**lab 4:**	quantitative ^{1}H 1D on Varian
March 27 & 29	COSY vs. TOCSY spectroscopy 1H-1H thru bond experiments		
April 3 & **5**	1H-1H thru space experiments 2D NOESY vs. ROESY theory and practice	**lab 5:**	COSY/TOCSY on Varian
April 10 & 12	special topics ideas: RDCs, protein NMR, large molecule NMR, DOSY Prep for end-of-semester student presentations		
April 17 & **19**	^{1}H-^{13}C HSQC (1-bond) and HMBC (2,3-bond) spectroscopy Experiment setup; data interpretation	**lab 6:**	HSQC/HMBC on Varian
April 24 & 26	Dynamic NMR: lineshape analysis vs. Coalescence T; rate constants k_c Intermolecular exchange processes		
May 1 & 3	**Final:** student presentations on special NMR topics		