Instrumental Analysis (Chem 341) – Fall 2014

This syllabus subject to change pending notification in class or via the email list

Tuesday & Thursday 9:40 – 11:00 am, Tomsich 001

Prof. Yutan Getzler

Office:	Tomsich 308	*Office hours:*	Monday, 11 am – 2 pm & Wednesday, noon – 1 pm
PBX:	5304	*email:*	getzlery
website:	http://chemistry.kenyon.edu/faculty/getzler.htm		

Goals: The primary goal of this course is that you gain comfort preparing samples, operating instruments and interpreting the resultant data. This is not a lecture course. Class time will be used to work on problems, answer questions and, most importantly, run experiments. You will spend a significant amount of time outside of regularly scheduled hours working in the lab. You will be asked to recall material from other courses. Utilize your varied backgrounds, do your best, and have fun! Laboratories are scientists' playgrounds.

Course Structure:

Mondays

Chemical safety data sheets (see the Laboratory Component) are due by the time I arrive on Monday. This time is variable, but once I have arrived, submissions will be counted towards the next week, if possible, so it is best to complete these by Sunday night. Completed forms should be tacked to the wall outside Tomsich 001.

Tuesdays

Class will start with a quiz covering the previous week's material. For each quiz you may bring one 8.5 x 11" piece of paper with your own handwritten notes. Following the quiz, we will proceed directly to lab.

Thursdays

Do the study problems in the notes for the week. We will go over them at the beginning of class. If you are not prepared, class time will not be productive (and you will find the next quiz difficult). For weeks with FIGURE listed on the syllabus, find and a primary literature spectrum of the instrumental method in question. For example, if the topic is NMR, look through journals for an NMR spectrum that you can explain. Be prepared to report the instrument operating conditions. Similarly, for weeks with EXAMPLE listed, find a literature use of the technique. At some point during the indicated week, explain the figure or example to me in class or office hours.

Fridays

You may turn in up to two lab reports by noon on Friday each week as indicated. (Late reports will count for the following week.) The grading scale is based on 11 lab reports; extra experiments count as extra credit. See the lab manual for more detail.

Point Distribution: (931 total)

Quizzes (12 x 30 pts)	360	Experimental reports (11 x 26 pts)	286
Figures/examples (8 x 10 pts)	80	Safety sheets (6 x 10 pts)	60
Final exam (12/16, 1:30 pm)	100	Lab checkout & cleanup (45 pts)	45

Grading: Your performance will be evaluated over the entire semester based upon the following absolute scale: 97% --> A+; 93% --> A; 90% --> A-; 87% --> B+; 83% --> B; 80% --> B-; 77% --> C+; 73% --> C; 70% --> C-; 67% --> D+; 63% --> D; 60% --> D-; <60% --> F.

Academic Honesty: "Kenyon College is, at the core, an intellectual community of scholars – students and faculty – engaged in the free and open exchange of ideas. Critical to this lively exchange and deep engagement with ideas is the academic integrity of our work, both inside and outside the classroom." In short, all materials submitted for credit must be your own work (`tinyurl.com/KC-Acad-Honesty`). I recognize the value of collaborative learning and encourage you to interact with each other in the lab. In all cases you must prepare your own samples, acquire your own spectra/chromatographs/etc and clearly acknowledge any intellectual or physical contributions that aided in completion of the assignment.

ADA Accommodations: If you require accommodation to fully participate in this class, identify yourself to Erin Salva, Coordinator of Disability Services (PBX 5145, salvae@kenyon.edu).

Tuesday		Thursday	
	LAB CHECK IN	**August 28**	
	Electromagnetic Spectrum, NMR process		
	Intro Notes; Skoog 24; NMR-1 Notes; Silverstein 3.1-3.3		
September 2	LABS 1-6	**4**	*LABS DUE*
	Electromagnetic Spectrum, NMR process,		
	Intro Notes; Skoog 24; NMR-1 Notes; Silverstein 3.1-3.3		
9	LABS 1-6	**11**	*LABS DUE*
	NMR chemical shifts, coupling, magnetic equivalence		
	NMR-1 Notes; Silverstein 3.4-3.5, 3.8-3.15; any organic text		
16	LABS 1-6	**18**	*LABS DUE*
	Relaxation, exchange, splitting by other nuclei, paramagnetic shifts		
	NMR-2 Notes; Silverstein 3.6-3.7		
23	LABS 1-10 & 17	**25**	*LABS DUE*
	Non-hydrogen NMR, special pulse methods, 2D NMR		
	NMR-3 & 4 Notes; Silverstein 4, 5, 6, 3.16		*NMR Figure*
30	LABS 1-17	**October 2**	*CHEM 233 UNKNOWNS*
	Molecular Spectroscopy, force constants, organic infrared		
	IR-1 Notes; Silverstein 2; any organic text		
October 7	LABS 1-17	**9**	¡¡READING DAY!!
	Inorganic Infrared, Raman, symmetry		
	IR-2 Notes; any inorganic text		*IR/Raman Figure*
14	LABS 1-17	**16**	*LABS DUE*
	EPR hyperfine, splitting diagrams, anisotropic, fine splitting		
	EPR Notes		*EPR Figure*
21	LABS 1-22	**23**	*LABS DUE*
	Electronic absorption spectroscopy, fluorescence		
	EAS Notes; Skoog 26, 27		*EAS Figure*
28	LABS 1-23	**30**	*LABS DUE*
	Atomic Absorption		
	AA Notes, Skoog 28A-C		*AA Example*
November 4	LABS 1-26	**6**	*LABS DUE*
	Chromatography: Theory, HPLC, ion, GC, SFC		
	C Notes; Skoog 31-33		*C Example*
11	LABS 1-29	**13**	*LABS DUE*
	Mass Spec: probability, parent & isotope peaks, fragments		
	MS Notes; Silverstein 1		*MS Example*
18	LABS 1-31	**20**	*LABS DUE*
	Voltammetry: polarography, differential pulse, cyclic		
	iV Notes; Skoog 23		*iV Figure*
Thanksgiving			
December 2	LABS 1-31	**4**	*LABS DUE*
	Characteristic x-rays, Mossbauer		*Last Chance to Submit Labs!*
	X-Ray, MB Notes		
9		**11**	
	Comparison of methods		
	Notes Review; Silverstein 7, 8	¡¡LAB CHECKOUT & CLEANUP!!	

Required Texts: *Instrumental Methods Notes and Lab Manual*
Spectrometric Identification of Organic Compounds any edition
Fundamentals of Analytical Chemistry any edition