Chemistry 4B
General Chemistry
Spring 2013

Instructors:	Dr. Michelle Douskey	Professor Jamie Cate
Office Hours	Wednesday 2-3PM and Thursday 2-3PM in 307 Latimer	TBA 708B Stanley Hall
Email:	douskey@berkeley.edu lecturing the first 7 weeks on quantitative analysis, instrumental methods, green chemistry and electrochemistry	jcate@lbl.gov lecturing the second 7 weeks on kinetics, introductory organic, chemical biology and special topics
Class Meetings	MWF 10:10-11:00 AM in 1 Pimentel Hall	
Required Materials:	Three textbooks are required, plus a laboratory manual (1) Principles of Modern Chemistry, by Oxtoby, Gillis and Campion, 7th edition, Cengage 2012 (2) Quantitative Chemical Analysis, by Harris, 8th edition, Freeman 2010 (3) Custom eBook supplement for environmental chemistry and chemical biology (4) Lab Manual, available as downloads on bspace	
Course Website	http://bspace.berkeley.edu	

EXPECTATIONS: In this course, the main goal is for you to develop your critical thinking skills in chemistry by learning about a wide variety of applications. Specifically, we will be building knowledge of chemistry, but also about the scientific process in general.

CLASS ACTIVITES: Class time will consist of lecture, demonstrations, discussions, and short group activities/problem solving. Participation in discussion is expected and will maximize your learning.

bSpace: You can log on to bSpace using your Calnet ID. In addition to posting relevant course information, we will be using bSpace as an online management tool for the grading database. You will be able to check your grades online throughout the semester.

WEEKLY REVIEWS: The GSIs will be hosting weekly review sessions on Tuesdays from 6-7:30PM in 120 Latimer. These sessions will likely focus on the chemistry and report writing of the laboratory portion of the course.

HOMEWORK: Homework will be assigned weekly and graded by your lab GSI. Homework is due when you get to class on Friday, the week after it is assigned. The first homework is due February 1st. Each homework assignment will be worth 4 points. The GSIs will spot check four problems, so be sure to attempt to answer all the questions. You must show your own work to receive credit. The week of an exam, homework will be assigned but not graded. These problems will be helpful to you in your studying but not collected. No late homework will be accepted.

LAB: Detailed information about the laboratory portion of the course can be found in the lab manual. There will be six experiments that span the first ten weeks of the semester. The lab period lasts for 4 hours beginning with a brief prelab discussion facilitated by your GSI. The rest of the lab time will be devoted to performing the experiment and writing up your lab report. In most instances, lab reports are due the week after you complete lab. In some cases we allow an extra week to work around exams. Students must always turn in their own work, even when collaborating with lab partners. Consult the schedule listed in the lab manual. Late lab reports will incur a 20% per day penalty. The last six weeks will be devoted to planning and executing a longer research project. Students will work in pairs for their research project. At the end of the semester on Saturday, May 11th, students will present posters on their work. Attendance and completion of all lab experiments is mandatory. If you miss a lab session, you will fail lab and earn no higher than a D for your course grade. If you miss lab due to illness or family emergency, please contact the storeroom supervisor, Luisa Smallwood, to reschedule.

CHEATING AND PLAGIARISM: We expect you to follow the guidelines specified in Berkeley's Code of Student Conduct. Incidences of cheating will be taken seriously and paperwork will be filed with the Office of Student Conduct. Resist the temptation to copy answers from solutions manuals.

EXAMS: There will be three midterm exams in this course administered during class on the following dates: February 11, March 4, and April 8. If you cannot be present to take the exams at these times, you cannot take Chem 4B. Exam questions will be taken from material covered in the course from lecture, lab, discussion, demonstrations, and applications. The final exam for this course will be cumulative and will be on Wednesday, May 15th, from 8:00-11:00 AM. More details about the exam policies for Chem 4B can be found on our course website.

GRADING POLICY: The different aspects of the course will be graded as follows.

	Percent of Grade
Lab	35%
Homework (10 HW, 4 pts each)	5%
Exams (3 midterms, 1 final)	60%
Course Total	100%

OVERALL GRADE FOR THE COURSE:
Your overall grade for the course will be determined by the number of points you earn in the course. The intended grade ranges for the course are listed below. Since we are grading on a straight scale, everyone has the chance to succeed and students are encouraged to help each other to maximize learning. The +/- cutoffs will not be published or released to students (not even at the end of the semester). Grade cutoffs may be lowered in extreme circumstances, but they will not be raised. If you earn greater than 87.5% in this class, you are guaranteed to fall in the 'A' range. For example if you earn 88% of the course points you will receive an A- in the class.

Grade	**Percentage Range**
A	87.5-100
B	75.0-87.4
C	60.0-74.9
D	45.0-59.9
F	<45.0

Unit 1 Syllabus*

Mon	***Tue***	***Wed***	***Thu***	***Fri***	**Weekly Reading (R), Homework (H), and Lab (L)** (*Ox* for Oxtoby and *H* for Harris)
21 Martin Luther King Day	**22**	**23** Course intro and review of 4A concepts	**24**	**25** Measurements, Error, Statistics, green chemistry	**R1:** *H* Ch 0-3 **H1:** *H* 0-2, 0-4, 1-23, 2-15, 2-16, 3-7, 3-11, 3-13, 3-16, 3-19 and green chemistry questions posted on bspace **(due Feb. 1)** **L1:** Check In
28 Chemical principles of chromatography	**29**	**30** Complexometric titrations	**31**	**1** Calibration curves, sampling	**R2:** *Ox* Ch 3.6-3.11, 7.1-7.7, 10.1-10.3, 11.2, 11.5; *H* Ch 11, 17, 18, 22 **H2:** *Ox* 3.13, 3.34, 3.60, 3.64, 10.16, 10.18, 14.72, 14.105, 20.32, 20.33; *H* 17-10, 17-13, 20-17, 20-21, 20-22 and questions posted on bspace **(due Feb. 8)** **L2:** Quantitative Analysis of a Solution Containing Co and Cu (separation by chromatography)
4 Intro to spectroscopy	**5**	**6** Atomic spectroscopy	**7**	**8** Molecular Spectroscopy, Exam Review	**R3:** *Ox* Ch 20.1, 20.2, 20.5; *H* Ch 4, 5, 20 **H3:** *Ox* 20.38, 20.39, 20.40; *H* 4-G, 4-17, 4-32, 5-24, 5-25, 22-2 and questions posted on bspace **(not collected but recommended for the exam)** **L3:** Quantitative Analysis of a Solution Containing Co and Cu (analysis of Co by EDTA) **Projects:** Two project ideas due
11 **Midterm #1** (in class)	**12**	**13** Interpreting chromatograms, chromatography theory	**14**	**15** GC	**R4:** *H* Ch 22, 23, 24 **H4:** Ox Ch 10.22, 10.24; *H*, 22-18, 22-45, 23-14, 23-23, 24-A, 24-D, 24-15, 24-19 and library assignment **(due Feb. 22)** **L4:** Quantitative Analysis of a Solution Containing Co and Cu (analysis of Cu by AAS)

*A complete syllabus for the whole semester will be available on the course website as we proceed.

Unit 2 Syllabus

Mon	*Tue*	*Wed*	*Thu*	*Fri*	**Weekly Reading (R), Homework (H), and Lab (L)** (*Ox* for Oxtoby and *H* for Harris)
18 President's Day Holiday	**19**	**20** HPLC	**21**	**22** Applications of Chromatography	**R5:** *Ox* Ch 17; *H* Ch 13 **H5:** *Ox* 17.2, 17.6, 17.26, 17.28, 17.36, 17.45 *H* 13-K, 13-6, 13-11, 13-13 **(due Mar. 1)** **L5:** Extraction and Quantitative Analysis by Gas Chromatography, part 1 **Projects:**
25 Cell potential and Equilibrium, Electrical Work and Free Energy	**26**	**27** Fuel Cells	**28**	**1** pH probes, Ion Selective Electrodes	**R6:** *H* Ch 14 **H6:** *H* 14-13, 14-23, 14-38 **(not collected but recommended for the exam)** **L6:** Analysis of GC data from previous week and Thin Layer Chromatography of Thyme Leaf Extracts
4 **Midterm #2** (in class)	**5**	**6** Prof. Doudna Cate starts lecturing Topic:TBA	**7**	**8** Topic:TBA	**R7:** TBA **H7:** TBA **L7:** TBA (a short activity on elevator pitch) **Projects:** Materials Requests

Week	Lecture #	Day	Date	Lecture Topics	Weekly reading (R), Homework (H), and Lab (L)
Week 7		M	4-Mar-13	**Midterm #2**	L: Materials Request, Elevator Pitch
	17	W	6-Mar-13	Chemical kinetics	R7: H17; O18
	18	F	8-Mar-13	Chemical kinetics	H7 (due 3/15): Ha17.4, Ox (18.2, 18.5, 18.10, 18.18, 18.22, 18.32, 18.56)
Week 8	19	M	11-Mar-13	Chemical kinetics	L5: Bleach kinetics
	20	W	13-Mar-13	Intro to Chemical Biology	R8: Ox18, Ox7.6-7.7, Ox23.4, Le2, Le3
	21	F	15-Mar-13	Proteins: Primary structure/peptide bond	H8 (due 3/22): Ox23.18 plus posted problems
Week 9	22	M	18-Mar-13	Proteins: Secondary structure	L7: Protein folding
	23	W	20-Mar-13	Proteins: Protein folding	R9: Le3, Le4, Le6.1-Le6.4 (Chymotrypsin)
	24	F	22-Mar-13	Enzymes pt. 1: From structure to kinetic mechanism	H9 (for study purposes): MT3 from last year, plus posted problems
		M	25-Mar-13		
		W	27-Mar-13	Spring Break	
		F	29-Mar-13		
Week 10	25	M	1-Apr-13	Enzymes pt. 2, Special Projects discussions	L8: Special projects
	26	W	3-Apr-13	Special Projects discussions	
	27	F	5-Apr-13	Review for MT3	H10 (due 4/12): Problems to be posted
Week 11		M	8-Apr-13	**Midterm #3**	

Week	Lecture #	Day	Date	Lecture Topics	Weekly reading (R), Homework (H), and Lab (L)
	25	M	1-Apr-13	Enzymes, Special Projects discussions	L8: Special projects!
Week 10	26	W	3-Apr-13	Special Projects discussions	
	27	F	5-Apr-13	Review for MT3	H10 (due 4/12): TBD
		M	8-Apr-13	**Midterm #3**	L8: Special projects!
Week 11	28	W	10-Apr-13	The genomic era of chemical biology	R11: O23.4, Le 8
	29	F	12-Apr-13	Nucleic acids: Nucleosides and nucleotides	H11 (due 4/19): TBD
	30	M	15-Apr-13	DNA properties	L8: Special projects!
Week 12	31	W	17-Apr-13	RNA properties	R12: Le 8, Blackburn&Gait chapter (reference)
	32	F	19-Apr-13	Polymerase Chain Reaction (PCR) and DNA replication	H12 (due 4/26): TBD
	33	M	22-Apr-13	Michelle Douskey, TBD	L8: Special projects!
Week 13	34	W	24-Apr-13	Michelle Douskey, TBD	R13: TBD
	35	F	26-Apr-13	Climate change and carbon emissions	H13 (for study purposes): Final from last year, TBD
	36	M	29-Apr-13	Fossil fuel properties	L8: Special projects!
Week 14	37	W	1-May-13	Biofuels and chemical biology	R14: Le 7
	38	F	3-May-13	Biofuels and chemical biology, cont'd	
		M	6-May-13	Final exam review, Pimentel Hall	
Week 15		W	8-May-13	Final exam review, Pimentel Hall	
		F	10-May-13	Reading and recitation (no class)	
		S	11-May-13	**Posters**	
		W	15-May-13	**Final exam**	