20.309 Schedule for Fall 2008

LAB

	Lecture 1: **Course Overview**	*Thurs, September 4*
	Electronics	
	Lecture 2: **Voltage dividers and electrical impedance**	*Fri, September 5*
	Reading: H&H p. 3-24	
0. Intro to	Lecture 3: **Capacitors and RC circuits**	*Tues, September 9*
Electronics	Reading: H&H p. 32-35 and 6.002 notes p. 703-718, 993-1004	
|	Lecture 4: **Transfer Functions and RC filters**	*Thurs, September 11*
|	Reading: H&H p. 37-40, 46-53 6.002 notes p. 1004-1012, 1030-1054	
|	Lecture 5: **Thermodynamics of DNA melting**	*Fri, September 12*
	Reading: SantaLucia, p. 1460-1462	
1. DNA	Lecture 6: **Feedback and Amplifiers I** **Quiz #1 on Lab #1, pI**	*Tues, September 16*
Melting	Reading: H&H p. 163-176 and 6.002 notes p. 1185-1191	**HW #1 Due**
|	Lecture 7: **Feedback and Amplifiers II**	*Thurs, September 18*
|	Reading: 6.002 notes p. 1191-1220	
|	Lecture 8: **The Reality of Amplifiers**	*Fri, September 19*
|	Reading: TBA	
	Signals and Systems	
|	Lecture 9: **Intro to Fourier Analysis** **Quiz #2 on Lab #1, pII**	*Tues, September 23*
|	Reading: Strang p. 263-275, 309-315	**HW #2 Due**
|	Lecture 10: **Power Spectral Density, Noise and Bandwidth**	*Thurs, September 25*
|	Reading: Press p. 496-500 (on PSD)	
|	Lecture 11: **Sampling and Discrete Analysis**	*Fri, September 26*
|	Reading: Tutorial and Press p. 500-504 and	
|	Lecture 12: **Convolution**	*Tues, September 30*
|	Reading: Seung notes (except Sections 3,5,7,8)	**HW #3 Due**
|	Lecture 13: **Application of Convolution Theorem**	*Thurs, October 2*
|	Reading: none	
|	DEMO: **Thermal Measurement Laboratory**	*Fri, October 3*
	Reading: Lab Module #2	
2. Thermal	Lecture 14: **Mechanical Systems** **Quiz #3 on Lab #2**	*Tues, October 7*
Measurement	Reading: Strang p. 316-320	**HW #4 Due**
|	Lecture 15: **Ultimate limits of force and position detection**	*Thurs, October 9*
|	Reading: none	
|	**Student presentations 1** **Lab #1 Due**	*Fri, October 10*
	DEMO: **Laser Safety, Student presentation 2**	*Tue, October 14*
|	Reading:	
		HW #5 Due
|	Lecture 16: **Optics and Microscopy I**	*Thurs, October 16*
|	Reading: Hecht 2.1-2.9, 4.1-4.5, 5.1-5.3	
4.	Lecture 17: **Optics and Microscopy II**	*Fri, October 17*
|	Reading: Hecht 7.1, 7.3, 9.1, 9.3	
	Lecture 18: **Optics and Microscopy III**	*Tues, October 21*
Fluorescence	Reading: Hecht 10.1, 10.2.1, 10.2.5, 10.2.6	
Microscopy		
	Lecture 19: **Optoelectronics I** **Quiz #4**	*Thurs, October 23*
	Reading: Hecht 13.1-13.1.4	
	Optical Construction; Student presentation 3 **Lab #2 Due**	*Fri, October 24*
	Lecture 20: **Optoelectronics II**	*Tue, October 28*
	Reading: Masters & So 12.1-12.5.7	**HW #6 Due**

Lecture 21: **Image Processing I** **Quiz #5** *Thurs, October 30*
Reading: Gonzalas & Wood 4.1-4.4, 8.4.1-8.4.2
Lecture 22: **Image Processing II** *Fri, October 31*
Reading: Gonzalas & Wood 7
Lecture 23: **Fluorescence spectroscopy I** **Quiz #6** *Tue, November 4*
Reading: Cantor & Schimel 8.2, p.433-444, Lakowicz, 1.1-1.6
HW #7 Due
Lecture 24: **Fluorescence spectroscopy II** *Thur, November 6*
Reading: Cantor & Schimel 8.2, p.444-465
Final project presentation *Fri, November 7*
Lecture 26: **Optical trap & Biomechanics** **Quiz #7** *Thur, November 13*
Reading:
HW #8 Due
Student Presentation 4 **Lab #3 Due** *Fri, November 14*
Lecture 27: **Advanced Fluroescence Microscopy I: Resolution** *Tue, November 18*
Reading: Hell, Nat. Biotech, 2003, Rust, Nat. Meth. 2006
HW #9 Due
Student Presentation 5 *Thur, November 20*
Lecture 28: **Advanced Fluroescence Microscopy II: Biochemistry** *Fri, November 21*
Reading: Kim, Nat. Meth. 2007, Jares-Erijman, Nat. Biotech., 2003
Student Presentation 6 *Fri, November 25*
Lecture 30: **3D Microscopy I: Confocal** *Tue, December 2*
Reading: Pawley, 1
Lecture 31: **3D Microscopy II: Multiphoton** *Thurs, December 4*
Reading: So, Ann Rev 2000, p.400-410, 414-418
Lecture 32: **3D Microscopy III: Demo** *Fri, December 5*
Student Presentation 7 *Tue, December 9*
HW #9 Due
Lab #4 Due (ok?) *Fri, December 19*