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**	*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**	*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**	*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*
|	**Laser Safety, Student presentation 2**		*Tue, October 14*
|			**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		
|	Lecture 17: **Optics and Microscopy II**		*Fri, October 17*
|	Reading: Hecht 7.1, 7.3, 9.1, 9.3		
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			**HW #6 Due**
|	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 #7 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 #8 Due
	Lecture 24: **Fluorescence spectroscopy II**		*Thur, November 6*
	Reading: Cantor & Schimel 8.2, p.444-465		
	Final project presentation		*Fri, November 7*
4. Project Labs	Lecture 26: **Optical trap & Biomechanics**	**Quiz #7**	*Thur, November 13*
	Reading:		**HW #9 Due**
	Student Presentation 4	**Lab #3 Due**	*Fri, November 14*
	Lecture 27: **Advanced Fluroescence Microscopy I: Resolution**		*Tue, November 18*
	Reading: Hell, N.Bio, 2003, Rust, N.. Meth. 2006		**HW #10 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**	**Quiz #8**	*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*
		Lab #4 Due	*Fri, December 19*