

Physics 6567 * Ultrafast Optics * Spring 2009

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<u>Lect #</u>	<u>Topic</u>	<u>Background</u>
1	Introduction to ultrafast optics	Notes
2	Ultrashort pulse generation	DR ch 5 or R ch 3,4 or D ch 2
3	Characteristics of ultrashort light pulses I	Trebino ch 2
4	Characteristics of ultrashort light pulses II	Trebino ch 2
5	Dispersion and propagation of ultrashort pulses	R ch 2
6	Spatio-temporal optics	S ch 14-17
7	Nonlinear optics and phase-matching	Trebino ch 3
8	Second-harmonic generation and electro-optics	Trebino ch 3
9	Four-wave mixing and continuum generation	DR sections 3.3-3.5; A ch 1
10	Measuring ultrashort laser pulses: autocorrelation	Trebino ch 1, 4
11	Measuring ultrashort laser pulses: FROG	Trebino ch 5-12,16
12	Ultrafast Interferometry	Trebino ch 22,23
13	Pulse shaping	Notes, DR ch 7
14	Ultrafast spectroscopy	H (all); E (all); DR ch 9, 10
15	Theory of ultrafast spectroscopy: Feynman diagrams	DR section 3.1
16	Coherent control of chemical reactions	DR section 11.1
17	Medical imaging with ultrashort pulses	F ch 14,15
18	Mode-locking theory	D ch 1, R ch 1
	Lab tour	Trebino ch 12,17,25
19	Amplification of ultrashort pulses	DR ch 6, F ch 2,4
20	Focusing of ultrashort pulses	Notes, DR section 2.5
21	TeraHertz pulse generation	M (all); R ch 10, F ch 11
22	Ultrafast micro-machining	F ch 6-8
23	High-harmonics and ultrashort x-ray pulses	Notes
24	Attosecond pulses	Notes, F ch 12

Books you should buy or have available:

Trebino, *Frequency-Resolved Optical Gating: The Measurement of Ultrashort Laser Pulses*
Rulliere, *Femtosecond Laser Pulses*

Books that are also helpful, but you probably don't want to buy:

Diels and Rudolph (DR), *Ultrashort Laser Pulse Phenomena*

Duling (D), *Compact Sources of Ultrashort Pulses*

Elsaesser (E), *Ultrafast Phenomena XII*

Alfano (A), *The Supercontinuum Laser Source*

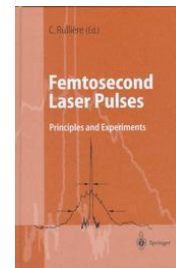
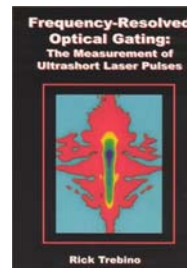
Siegman (S), *Lasers*

Fermann, et al. (F), *Ultrafast Lasers*

Mittleman (M), *Sensing with Terahertz Radiation*

Hannaford (H), *Femtosecond Laser Spectroscopy*

Kartner (K), *Few-Cycle Laser Pulse Generation and Its Applications*



Office hours: after class

Call me anytime: 404-510-1690 (cell)