

Modern Optics, Optics 569
Mon. and Wed. 5:30- 6:45 pm,
P&A Room 184

Instructor

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Office hours by appointment

The class will cover the topic of the book: “Ultrashort Laser Pulse Phenomena”, second edition. Some new material not yet included in the book will be put on the Webb site: <http://panda.unm.edu/jcdiels/> The main topics of chapters 1 through 6 (excluding some subsections) will be covered (Fundamentals, Femtosecond Optics, Light-matter interaction, Coherent phenomena, and ultrashort sources) as well as some selected applications.

Recommended Text

Ultrashort Laser Pulse Phenomena J.-C. Diels and W. Rudolph,
Academic Press (first edition out of print)
Lasers by A. Siegman, University Science Books.

Grading

The homework will include problems from the book, as well as practical problems (projects) related to specific laser design or applications.

Grading will be based on projects and problems, and on a final oral presentation on a topic related to ultrashort pulse phenomena (20 minutes presentation). The topic of the presentation should be finalized before March 9 (Monday).

Homework/projects	70%
Final presentation	30%

Heading	Topic	Date	
Single pulse description	Complex envelope, Fourier transforms,	01/21/09	
	CEP, Chirp, uncertainty relations,	01/26/09	
	Propagation through linear media	01/28/09	
Manipulation of pulses	modulation, dispersion, compression	02/02/09	
	Kerr effect and dispersion	02/04/09	
A mode-locked laser	Fabry-Perot, Ring resonator	02/09/09	
How to generate pulses	Kerr lensing, saturable absorption	02/11/09	
	The frequency comb; the CEO	02/16/09	
	Creating and controlling frequency combs	02/18/09	
	Optical elements inside the laser, prisms, mirrors	02/23/09	
	gratings, to control duration and CEO	02/25/09	
	Laser sources	Ti:sapphire, Vanadate,	03/02/09
	Semiconductor, disk; High rep rate/ high peak	03/04/09	
Going to Petawatts	Fiber lasers,	03/09/09	
	Optical Parametric Oscillators (OPO)	03/11/09	
	Laser amplifiers,	03/23/09	
Pulse Characterization	OPO, CPOPA	03/25/09	
	White light interferometry	03/30/09	
	Autocorrelations, cross correlations	04/01/09	
Novel topics	spider, frog, etc..	04/06/09	
	Attoseconds and	04/08/09	
High Fields	High Harmonics	04/13/09	
Filaments		04/15/09	
Sensors		04/20/09	
		04/22/09	