## EEE 165 Introduction to Optical Engineering, 3 units

Fall 2012, Section 1, Call No. 85819, Tues/Thur 1:30 – 2:45 P.M. Douglas Hall Room 209

**Course Content:** Generation, propagation and detection of light. Fresnel equations, Snell's law, diffraction, polarization and interference. Operating principles of LED's, lasers, photodiodes and optical fibers. Introduction to Optical Communication Systems, integrated optical devices and optical instrumentation.

**Prerequisite:** EEE 161 Transmission Line and Fields. **Corequisite:** EEE 185 Modern Communication Systems.

Textbook:	<i>Optoelectronics and Photonics: Principles and Practices</i> , Safa O. Kasap, Prentice Hall Europe, 1 <sup>st</sup> Edition, 2001. ISBN: 0-201-61087-6		
Instructor:	Russ Tatro email: <u>rtatro@csus.edu</u> Office Phone: 278-4878 Office Hours: See my webs	Office: Riverside 5030 website: <u>www.csus.edu/indiv/t/tatror</u> site for current office hours or by appointment	

EEE 165 Grading:	Midterm 1	35%
	Midterm 2	35%
	Final Exam	30%

All homework assignments and solutions, handouts and other items will be posted on my website. **Homework:** Problems shall either be from the textbook or created by the instructor. Homework is not collected nor counts towards your grade. Check my website for homework assignments. All homework material is testable whether covered in class or only in the homework assignment.

**Exams:** There shall be two midterm exams and a final exam during the semester. Each shall have similar formats and will be open notes and book. Only those notes, handouts, and textbook used in this course, EEE 165, Fall 2012, shall be allowed. **Prior** permission is required for all make-up exams. Be prepared to show your student ID (one card) in order to take the exam.

**Grading Policy:** Grades may be curved at the instructor's discretion. The class average is typically in the B- range. Typical grades ranges are:

A - 90 and above B - 80 - 89 C - 70 - 79 D - 69 - 60 F - Below 60

Week	DATE:	SECTIONS:	TOPICS:
1	08-28	1.1 – 1.2	Introduction: Wave Nature of Light, Refractive Index
-	08-30	1.3 – 1.5	Group Velocity, E & B fields in Light, Snell's Law
2	09-04	1.6 – 1.7	Fresnel Equations, Interference
_	09-06	1.8 - 1.10	Coherence, Diffraction
3	09-11	7.1	Polarization
_	09-13	7.2	Birefringence
4	09-18	7.3	Birefringent Optical Devices
-	09-20	7.4	Optical Activity and Circular Birefringence
5	09-25	2.1 - 2.2	Slab Waveguide, Dispersion
-	09-27	2.3 - 2.5	Step Index Fiber, Numerical Aperture, Dispersion in single
			mode fibers
6	10-02	2.6 - 2.10	Optical Bandwidth, Graded Index Fiber, Scattering,
			Attenuation in Fibers
	10-04	MIDTERM 1	Chapters 1 & 7
7	10-09	3.1 - 3.2	Semiconductor concepts, Energy Bands
	10-11	3.3 - 3.4	pn Junction principles, pn Junction Band Diagram
8	10-16	3.5 - 3.9	LED's
	10-18	4.1 - 4.7	Stimulated Emission, Gas Lasers
9	10-23	4.1 - 4.7	Stimulated Emission, Gas Lasers
	10-25	4.8 - 4.10	Laser Oscillation, Laser Diode, Rate Equation
10	10-30	4.11 - 4.15	Light emitters for Optical Fiber
	11-01	5.1 - 5.5	Photodetectors, pin detector
			Term Paper Due
11	11-06	5.1 - 5.5	Photodetectors, pin detector
	11-08		Avalanche Photodiode
		5.6 - 5.8	Heterojunction Photodiodes, Phototransistors,
12	11-13	5.9 - 5.10	Heterojunction Photodiodes, Phototransistors, Photoconductive
			detectors, Noise in Photodetectors
	11-15	MIDTERM 2	Chapters 2, 3, & 4
13	11-20		Review Midterm
			Solar Energy Spectrum, Photovoltaic Devices
	11-22	Holiday	Thanksgiving Holiday – no class
14	11-27	6.3 – 6.4	Pn Junction I-V Characteristics, Equivalent Circuit
	11-29	6.5 - 6.6	Temperature effects, Solar Cell Materials
15	12-04	Handout	Design Considerations for a Fiber Optic System.
	12-06	Handout	Design Considerations for a Fiber Optic System.
16	12-13	Final Exam	12:45 p.m. – 2:45 p.m.

EEE 165 - Section 1 - Course Outline – Fall 2012