Physics 431 - **Final Exam (12:45-2:45 pm 12/15/2010)**
TIME ALLOTTED: 120 MINUTES

Room 1420 BPS

The exam includes topics covered in lectures and labs throughout the semester. Greater emphasis will be placed on the 2nd half of the course.

The exam will consist of problems adding up to 250 pts. Your grade for the final exam will be your score x 0.10.

Topics to be covered

Nature of light: particles and photons, the electromagnetic spectrum, photon energy, momentum, optical force.

Waver properties of light/EM Waves: phase velocity, frequency, irradiance, 1D wave equation, harmonic waves, superposition of waves, complex representation of waves (amplitude and phase), plane waves, spherical waves, polarization, Malus's law.

Geometrical optics: Snell's law, refraction/reflection (application of Fresnel equations), total internal refraction, Brewster's angle, lens maker formula, imaging formula, concave mirror imaging, thin lens combination, dispersing prisms.

Optical instrumentation: stops, pupils, windows, microscopes, telescopes, human eyes, eye glasses.

Interference and interferometry: Young's double slit experiment, inference in dielectric films, anti-reflection coatings, Newtons' rings, Michelson interferometer and applications.

Diffraction: Fraunhoffer v.s. Fresnel diffraction, Fraunhofer diffraction from a single slit, double slits, and multiple splits, square and circular apertures (Sinc functions and Airy patterns), gratings, spatial resolution (Rayleigh's criterion).

Modern optics: Basic Fourier optics (including simple Fourier transform, wave properties of a thin lens, and spatial filtering), Basic holography and optical force, Gaussian beam optics.

Final Grades:

Grades will be weighted as follows:

	Points
Midterm I	15
Project (Midterm II)	15
Homework	15
Final Exam	25
Laboratory Reports	25
Lab Attendance/Performance	5
TOTAL	100

The guaranteed scale, which may be lowered but not raised, is:

Total accumulated points	Final grade
>92 pts	4.0
88-92	3.5
83-88	3.0
78-83	2.5
73-78	2.0
68-73	1.5
60-68	1.0
<50	0.0