

PHYS 541 Radiative Processes

Spring 2015 Syllabus

Instructor: Edison Liang, Room 342 Herman Brown Hall, x3524, email: liang@rice.edu

Time: TuTh 10:50 AM – 12:05 PM; Room: 254 Herman Brown Hall

Main Text:

Radiative Processes in Astrophysics, by George Rybicki and Alan Lightman (2004, Wiley)

Supplemental References:

Classical Theory of Fields, L. Landau & E. Lifshitz (Oxford)

Radiative Processes in Plasmas, G. Bekefi (Wiley)

The Physics of Astrophysics Vol.1: Radiation, F. Shu (University Science Books)

Radiation Processes in Astrophysics, W. Tucker (MIT)

Electromagnetic Processes, R. Gould (Princeton)

Quantum Theory of Radiation, W. Heitler (Dover)

Radiation in Astrophysical Plasmas, V. Zheleznyakov (Kluwer)

Principle of Lasers, O. Svelto & D. Hanna (Plenum)

Grades (tentative): 50% Homeworks, 50% Exam or Final Project.

Tentative Topics and Number of Lectures

TOPIC	TENTATIVE NO. OF LECTURES	R & L Chapter
Introduction & organization		
Radiative transfer	2	1
Thermal radiation, diffusion, Einstein coefficients	1	1
Radiation Fields, polarization, Stokes parameters	2	2
Radiation from moving charges	2	3
Special Relativity	2	4
Bremsstrahlung (free-free) radiation	2	5
Synchrotron radiation	2	6
Thomson & Compton scattering	3	7
Pairs & high energy processes	1	
Plasma and other medium effects	1	8
Atomic structure	2	9
Radiative transitions, Rayleigh scattering	3	10
Molecular structure	1	11
Stimulated emission, coherent radiation	1	
Other optional topics (TBD)	2	