

**Physics 541 Exam 4**  
**Due June 16, 2008**

Explain the physics for each topic below in your own words.

1	Time-dependent perturbation theory
2	Coherent versus incoherent transitions
3	Fermi's First Golden Rule
4	Fermi's Second Golden Rule
5	Fermi's Two Golden Rules combined into one
6	An application of Fermi's Golden Rules in atomic physics
7	An application of Fermi's Golden Rules in nuclear physics
8	An application of Fermi's Golden Rules in particle physics
9	The dipole selection rules for atomic transitions
10	The lifetimes of excited atomic states
11	Dipole, quadrupole, octupole, ..... electric and magnetic transitions
12	Sudden Perturbations
13	Rectangular pulse perturbations
14	Harmonic perturbations
15	Einstein's thermodynamic treatment of absorption and spontaneous and stimulated emission
16	The quantum version of absorption and spontaneous and stimulated emission
17	Write a ~1 page synopsis of Chapter 1 in QED: The Strange Theory of Light and Matter
18	Write a ~1 page synopsis of Chapter 2 in QED: The Strange Theory of Light and Matter
19	Write a ~1 page synopsis of Chapter 3 in QED: The Strange Theory of Light and Matter
20	Write a ~1 page synopsis of Chapter 4 in QED: The Strange Theory of Light and Matter