

# Course Schedule - Spring 2008

## Physics

598 **Special Topics in Physics** credit: 1 to 4 hours.

Lecture course in topics of current interest. Several subjects are announced in each Class Schedule. Among them are semiconductor physics, magnetic resonance, surface physics, lattice dynamics, band theory of solids, crystal imperfections, nuclear structure, field theory, elementary particle physics, advanced statistical mechanics, plasma theory, astrophysics, atmospheric physics, group theory and applications. Prerequisite: Determined for each offering; see Class Schedule.

CRN	Type	Section	Time	Days	Location	Instructor
36793	lecture	MAP	01:00 PM - 02:20 PM	TR	room 236 Loomis Laboratory	Demarco, B
<p>36793: 4 hours Modern Atomic Physics MODERN ATOMIC PHYSICS. Activity in atomic physics has exploded during the last fifteen years because of the development of new techniques for cooling atoms to nearly zero temperature and methods for coherent control of atomic quantum states. Ultra-cold atom gases are now used as primary time and frequency standards and as the most precise inertial sensors, while experiments with trapped atomic ions are the best candidate for building a quantum computer. Cold atomic and molecular gases are also used in experiments that probe fundamental symmetries. This course will focus on the physics behind current experiments in the field of atomic, molecular, and optical physics. Topics to be covered will include atomic structure; the interaction of atoms with electro-magnetic fields; atom trapping using magnetic, electric, and optical fields; laser and evaporative cooling; and atomic collisions.</p>						
36788	lecture	MMB	01:00 PM - 02:20 PM	TR	room 158 Loomis Laboratory	Stone, M
<p>36788: 4 hours Math Methods in Physics I MATHEMATICAL METHODS IN PHYSICS. A continuation of PHYS 598 MMA focusing on further core techniques widely used in the physical sciences. Emphasis is on applications, and a broad range of illustrative examples will be explored. Students do not need to have taken PHYS 598 MMA. Primary topics include: complex variables (analyticity, Cauchy's theorem, residue calculus, conformal mappings, integral transforms, asymptotic techniques, Riemann surfaces); group theory in classical and quantum systems (discrete and continuous groups, representation theory, physical applications of topology); tensors in physics (Cartesian tensors, curved spaces, elementary Riemannian geometry).</p>						
36792	lecture	PNM	09:00 AM - 10:20 AM	TR	room 144 Loomis Laboratory	Aksimentiev, O
<p>36792: 4 hours Physics of Nanomachines PHYSICS OF NANOMACHINES. Nature's molecular machines operate with astonishing fidelity under tremendous environmental stress. What is their secret? Can their functionality be realized in man-made devices? Answers to these questions require understanding physics of nanoscale systems and design principles of molecular biology. Through examples from biology and engineering, this course will introduce physical principles that govern operation of nanoscale machines. It will include concepts of biomolecular structure, non-equilibrium statistical physics, hydrodynamics, tribology, polymer physics, nanoelectronics and bioengineering. Topics to be covered in the course will include biological molecular motors, nano-electro-mechanical systems, biosensors, synthetic biomolecular machines and artificial cells. This course is intended primarily for students considering careers in biological physics or nanoscale engineering. Undergraduate students should consult the instructor about the course prerequisites.</p>						