# Class Schedule - Fall 2012

## Physics

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

Subject offerings of new and developing areas of knowledge in physics intended to augment the existing curriculum. See Class Schedule or departmental course information for topics and prerequisites. May be repeated in the same or separate terms if topics vary.

<table>
<thead>
<tr>
<th>CRN</th>
<th>Type</th>
<th>Section</th>
<th>Time</th>
<th>Days</th>
<th>Location</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>34868</td>
<td>Lecture</td>
<td>AEM</td>
<td>12:30 PM - 01:50 PM</td>
<td>TR</td>
<td>136 - Loomis Laboratory</td>
<td>Errede, S</td>
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**Credit Hours: 4 hours**

Analysis of Exper Measurements
Restricted to Graduate - Urbana-Champaign.

**ANALYSIS OF EXPERIMENTAL MEASUREMENTS.** This course will cover a number of topics including: The estimation of experimental uncertainties ("errors") on individual measurements, the extraction of physics parameters (and their associated uncertainties) from a set of measurements, hypothesis testing and Monte Carlo methods. The lectures will also discuss the basics of probability theory and examine various probability distributions that have common statistical applications. Various statistical concepts and applications including error propagation, data fitting using least-squares and maximum likelihood methods, goodness-of-fit, etc., will be discussed. The course will also explore practical problems such as random number generation and function minimization. There are no formal prerequisites, but the course will demand mathematical sophistication comparable to that required for Quantum Mechanics (PHYCS 486-7). Advanced undergraduate students may enroll with the consent of the instructor. There will be a text for the course and weekly homework problems will be assigned.

| 42392| Lecture  | CPA     | 12:30 PM - 01:50 PM | TR   | 144 - Loomis Laboratory | Shapiro, S |

**Credit Hours: 4 hours**

Topics in Comp Phys and Astr
Restricted to Graduate - Urbana-Champaign.

**TOPICS IN COMPUTATIONAL PHYSICS AND ASTRONOMY.** A numerical laboratory course designed to familiarize students with the use of a computer to solve diverse problems in physics. Problems will be drawn from several different branches of physics and astrophysics. Hydrodynamics, including the physics of shock waves, will be emphasized as the main paradigm for nonlinear phenomena. For the hydrodynamics, the necessary analytic results will be derived in class. Examples drawn from classical mechanics, electromagnetism, quantum mechanics, etc. will already be familiar to students from standard physics courses. Numerical methods discussed will include solving ordinary and partial differential equations, linear algebra and eigenvalue problems, Monte Carlo techniques, FFTs, etc. Students will work on assigned numerical exercises and simulations both individually and in small teams. The results of these simulations will be presented in class periodically and will constitute an integral part of the class development. The emphasis throughout the semester will be on building confidence and expertise at solving physical problems on the computer. Prerequisites: No formal requirements other than a working knowledge of some scientific programming language like Fortran, C, or C++. Graduate students and upper level undergraduates with solid backgrounds in basic physics are welcome. This course should only be taken by students who plan to participate actively.

| 60312| Lecture  | TPH     | 03:30 PM - 04:50 PM | TR   | 136 - Loomis Laboratory | Fradkin, E |

**Credit Hours: 4 hours**

Phases in Quantum CM

**TOPOLOGICAL PHASES IN QUANTUM CONDENSED MATTER.** This course will cover current developments on topological phases in condensed matter physics, including: the theory of the fractional quantum Hall states, spin liquids, topological insulators and superconductors, effective field theories of topological phases, quasiparticles, fractional statistics (Abelian and non-Abelian), experimental detection of quasiparticles, quantum interferometers and the manipulation of quasiparticles, topological phases and topological quantum computing, quantum entanglement at quantum criticality and in topological phases. The course material will consist primarily of a review of recent literature in leading journals.