

Course Schedule - Spring 2006

Astronomy

596 **Seminar in Special Topics** Credit: 0 to 16 hours.

May be repeated. Approved for both letter and S/U grading. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
43745	lecture	CAC	10:30 AM - 11:50 AM	MW	room 134 Astronomy Bldg	Ricker, P
<p>43745: 4 hours Comput Astrophys & Cosmol Computational Astrophysics and Cosmology This course prepares students to use numerical simulations to study complex problems in astrophysics and cosmology. Numerical methods and parallel computing will be covered together with the design, validation, and analysis of simulations. Emphasis will be placed on solving ordinary and partial differential equations that arise in astrophysical contexts. Students will work on assigned numerical problems and perform simulations using existing simulation codes, writing a final paper which presents the results of simulations using one of these codes. The instructor plans to obtain student accounts on NCSA supercomputers for these projects. Prerequisites: No other formal requirements except knowledge of a scientific programming language like Fortran, C, or C++. Familiarity with Unix/Linux and astronomical analysis tools is useful but not required. This course is intended for graduate students and upper-level undergraduates with strong physics backgrounds. Active student participation is expected.</p>						
43738	lecture	PC	02:00 PM - 02:50 PM	MWF	room 134 Astronomy Bldg	Fields, B
<p>43738: 4 hours Physical Cosmology ASTR 569 PC: Physical Cosmology We will survey the essentials of modern cosmology, providing an overview of the state of the field, of open questions, and of observational and theoretical tools. Planned topics include: classical cosmology--the Friedmann universe; the early universe--inflation, nucleosynthesis, dark matter; the cosmic microwave background--basic physics, anisotropies, polarization; large scale structure formation--theoretical and numerical models observational tests; dark energy--observational evidence, theoretical ideas. The emphasis will be on applying physical principles to understand observations, and on using observations to constrain the nature of matter and spacetime on cosmic scales--viewing the universe as a laboratory for fundamental physics. Course work will focus heavily on problem solving. The intended audience is first-year graduate students and beyond; prior knowledge of cosmology, general relativity, or particle physics is not required.</p>						
43747	lecture	SF	10:30 AM - 11:50 AM	TR	room 134 Astronomy Bldg	Mouschovias, T
<p>43747: 4 hours Star Formation ASTR 596 SF: This is a seminar course, with approximately half of the semester meetings being lectures and the other half presentations and discussions by students. There are no exams. There will be a paper by each student, which will also be presented orally to the class, on any one of a large number of topics (including observational ones) related to star formation, to be chosen by each student and the instructor. This could be a review of the literature or a short original project. The lectures will focus on the underlying physics of our best understanding of the theory of star formation. This includes (but is not limited to): (i) MHD waves and instabilities including the effects of radiation, thermal conduction and viscosity, and application to phase transitions (e.g., cloud-intercloud) in the interstellar medium; (ii) the angular momentum problem and magnetic braking (detailed analytical and numerical solutions); (iii) the role of ambipolar diffusion in protostar formation and the resolution of the magnetic flux problem; (iv) elements of theory of turbulence and its application to molecular clouds. All physical processes will be synthesized into a testable theory of protostar formation. Close contact with relevant observations will be maintained throughout all topics, both in the form of input to theory as well as in the form of testable predictions by theory. Prerequisites: desire to learn and an open mind! Ast502 is helpful but not necessary (the necessary background will be reviewed at the beginning of the course).</p>						