

Course Schedule - Spring 2006

Astronomy

100 *Perspectives in Astronomy* Credit: 3 hours.

One-term introduction to astronomy. The nature of science; sun, planets, and moons; origin of the solar system; nature and evolution of stars; exploding stars; stellar remnants, including white dwarfs, neutron stars, and black holes; molecules in space; galaxies and quasars; past and future of the universe; and life in the universe. Lectures and observation; a field trip to Parkland Staerkel Planetarium may be required, nominal charge. Credit is not given to students with credit in ASTR 121 or ASTR 122; not open to students with credit in PHYS 102, or equivalent. Students with credit in PHYS 102 are encouraged to take ASTR 121 or ASTR 122.

This course satisfies the General Education Criteria for a Physical Sciences course.

Students interested in ASTR 100 should also consider ASTR 121 or ASTR 122 which cover the same materials and topics but in two semesters instead of one. ASTR 121 and ASTR 122 include two lectures each week and one weekly small discussion meeting for more individual attention. ASTR 121 and ASTR 122 are independent offerings and can be taken in any order. While ASTR 100, ASTR 121 and ASTR 122 are for non-science majors, problem solving with basic algebra is required. Science and astronomy majors should take ASTR 210.

CRN	Type	Section	Time	Days	Location	Instructor
30779	lecture	1	10:00 AM - 10:50 AM	MWF	room 314 Altgeld Hall	Hail, T
30779: Physical Sciences course.						
30813	lecture	2	01:00 PM - 01:50 PM	MWF	room 112 Gregory Hall	Williams, R
30813: Physical Sciences course.						
39258	lecture	3	11:00 AM - 11:50 AM	MWF	room 100 Gregory Hall	Hail, T
39258: Physical Sciences course.						

113 *The Sky* Credit: 3 hours.

Examines the visual aspects and phenomena of the sky; astronomical lore and history. Prerequisite: ASTR 100, ASTR 121 or ASTR 122, or consent of instructor

This course satisfies the General Education Criteria for a Physical Sciences course.

CRN	Type	Section	Time	Days	Location	Instructor
43735	lecture	1	09:00 AM - 09:50 AM	MWF	room 103 Transportation Bldg	Kaler, J
43735: Physical Sciences course.						
43735: 3 hours Examines the visual aspects and phenomena of the sky; astronomical lore and history. Prerequisite: ASTR 100, 121 or 122, or consent of instructor.						

121 *The Solar System* Credit: 3 hours.

Introductory survey of the universe; structure and motions of the earth and moon; planetary motions; physical

nature of the planets; comets and meteors; origin and evolution of the solar system. Emphasis will be placed on problem-solving and scientific methods. Two lectures and one discussion each week, and observing sessions during the term. Intended for non-science majors; science and Astronomy majors should take ASTR 210. Credit not given to students with credit in ASTR 100 or ASTR 210 or GEOL 116; or in PHYS 212 or higher-level Physics course. Students with credit in PHYS 211 are encouraged to take ASTR 210. Prerequisite: Credit or concurrent enrollment in a Quantitative Reasoning I course.

This course satisfies the General Education Criteria for a Physical Sciences, and Quant Reasoning II course.

ASTR 121 and ASTR 122 cover the same topics as ASTR 100, but the material and topics are covered in much more depth over two semesters instead of one. ASTR 121 and ASTR 122 are independent offerings and can be taken in any order. While ASTR 121 and ASTR 122 are for non-science majors, problems solving with basic algebra is required. Science and astronomy majors should take ASTR 210. Students must register for one discussion and one lecture section.

CRN	Type	Section	Time	Days	Location	Instructor
30816	discussion-recitation	AD1	10:00 AM - 10:50 AM	T	room 136 Burrill Hall	Dunne, B; Seale, J
30816: Physical Sciences, and Quant Reasoning II course.						
30820	discussion-recitation	AD2	10:00 AM - 10:50 AM	T	room 313 Gregory Hall	Dunne, B; Indriolo, N
30820: Physical Sciences, and Quant Reasoning II course.						
30823	discussion-recitation	AD3	11:00 AM - 11:50 AM	T	room 164 Noyes Laboratory	Dunne, B; Seale, J
30823: Physical Sciences, and Quant Reasoning II course.						
30825	discussion-recitation	AD4	11:00 AM - 11:50 AM	T	room 221 Gregory Hall	Dunne, B; Indriolo, N
30825: Physical Sciences, and Quant Reasoning II course.						
30828	discussion-recitation	AD5	12:00 PM - 12:50 PM	T	room 164 Noyes Laboratory	Dunne, B; Seale, J
30828: Physical Sciences, and Quant Reasoning II course.						
30831	discussion-recitation	AD6	12:00 PM - 12:50 PM	T	room 207 Gregory Hall	Dunne, B; Indriolo, N
30831: Physical Sciences, and Quant Reasoning II course.						
39792	discussion-recitation	AD7	11:00 AM - 11:50 AM	T	room 441 Altgeld Hall	Dunne, B
39792: Physical Sciences, and Quant Reasoning II course.						
30832	lecture	AL1	12:00 PM - 12:50 PM	MW	room 124 Burrill Hall	Dunne, B
30832: Physical Sciences, and Quant Reasoning II course.						

122 **Stars and Galaxies** Credit: 3 hours.

Introduction to astrophysical objects and phenomena beyond the solar system, and the governing basic physical principles; galaxies, quasars, and structure of the universe; cosmology; the Milky Way; the interstellar medium and the birth of stars; distances, motions, radiation, structure, evolution, and death of stars, including neutron stars and

black holes. Emphasis will be placed on problem-solving and scientific methods. Two lectures and one discussion each week, and observing sessions during the term. Intended for non-science majors; science and Astronomy majors should take ASTR 210. Credit not given to students with credit in ASTR 100 or ASTR 210, or in PHYS 212 or higher-level physics course. Students with credit in PHYS 211 are encouraged to take ASTR 210. Prerequisite: Credit or concurrent enrollment in a Quantitative Reasoning I course.

This course satisfies the General Education Criteria for a Physical Sciences, and Quant Reasoning II course.

ASTR 121 and ASTR 122 cover the same topics as ASTR 100, but the material and topics are covered in much more depth over two semesters instead of one. ASTR 121 and ASTR 122 are independent offerings and can be taken in any order. While ASTR 121 and ASTR 122 are for non-science majors, problems solving with basic algebra is required. Science and astronomy majors should take ASTR 210.

CRN	Type	Section	Time	Days	Location	Instructor
30834	discussion-recitation	AD1	10:00 AM - 10:50 AM	W	room 398 Lincoln Hall	Looney, L; Bilikova, J
30834: Physical Sciences, and Quant Reasoning II course.						
30836	discussion-recitation	AD2	10:00 AM - 10:50 AM	W	room 204 Transportation Bldg	Looney, L; Hayes, B
30836: Physical Sciences, and Quant Reasoning II course.						
30839	discussion-recitation	AD3	11:00 AM - 11:50 AM	W	room 398 Lincoln Hall	Looney, L; Bilikova, J
30839: Physical Sciences, and Quant Reasoning II course.						
30840	discussion-recitation	AD4	11:00 AM - 11:50 AM	W	room 204 Transportation Bldg	Looney, L; Hayes, B
30840: Physical Sciences, and Quant Reasoning II course.						
30841	discussion-recitation	AD5	12:00 PM - 12:50 PM	W	room 398 Lincoln Hall	Looney, L; Bilikova, J
30841: Physical Sciences, and Quant Reasoning II course.						
30842	discussion-recitation	AD6	12:00 PM - 12:50 PM	W	room 204 Transportation Bldg	Looney, L; Hayes, B
30842: Physical Sciences, and Quant Reasoning II course.						
30844	discussion-recitation	AD7	12:00 PM - 12:50 PM	W	room 134 Astronomy Bldg	Looney, L
30844: Discovery, Physical Sciences, and Quant Reasoning II course. First Year Discovery Program Course. Registration restricted to freshmen. Students should enroll in only one Discovery course. Students who enroll in more than one Discovery course may be dropped from the additional Discovery Courses. For course descriptions, see the Discovery Program booklet.						
30845	lecture	AL1	01:00 PM - 01:50 PM	TR	room 1320 Digital Computer Laboratory	Looney, L
30845: Physical Sciences, and Quant Reasoning II course.						
30846	lecture	CH	11:00 AM - 11:50 AM	MWF	room 212 1205	Kaler, J

			AM		W Oregon	
30846: Camp Honors/Chanc Schol, Physical Sciences, and Quant Reasoning II course. For Chancellor's Scholars; others may enroll with consent of instructor and Director of the Campus Honors Program.						

199 **Undergraduate Open Seminar** Credit: 1 to 5 hours.
May be repeated. Approved for both letter and S/U grading.

CRN	Type	Section	Time	Days	Location	Instructor
43996	conference	DS1	06:30 PM - 08:30 PM	W	room 134 Astronomy Bldg	Chu, Y
43996: Discovery course. Meets 17-Jan-06 - 10-Mar-06.						
43996: 1 hours Meets first 8 weeks. 1 hour credit. S/U graded credit. Designed to let first year students majoring or interested in Astronomy meet faculty in a small group setting in the Astronomy Department. Students will meet in room 134 of the Astronomy building. First Year Discovery Program Course. Registration restricted to freshman. Students should enroll in only one Discovery course. Students who enroll in more than one Discovery course may be dropped from the additional Discovery courses. For course descriptions, see the Discovery Program booklet.						

210 **General Astronomy** Credit: 3 hours.

Survey of modern astronomy for students with background in physics. Topics include: the solar system; nature and evolution of stars; white dwarfs, neutron stars, and black holes; galaxies, quasars and dark matter; large scale structure of the universe; the Big Bang; and Inflation. Emphasis will be on the physical principles underlying the astronomical phenomena. Credit is not given to students who have credit in ASTR 100 or in ASTR 121 and ASTR 122. Prerequisite: Credit or concurrent registration in PHYS 212.

This course satisfies the General Education Criteria for a Physical Sciences course.

CRN	Type	Section	Time	Days	Location	Instructor
30855	lecture	1	03:00 PM - 03:50 PM	MWF	room 134 Astronomy Bldg	Gammie, C
30855: Physical Sciences course.						

350 **Introduction to Cosmology** Credit: 3 hours.

Descriptive course on modern cosmological theories. Topics include aspects of special and general relativity; curved spacetime; the Big Bang; inflation; primordial element synthesis; the cosmic microwave background; the formation of galaxies and large scale structure. Prerequisite: ASTR 100, or ASTR 121, or ASTR 122, or ASTR 210, or consent of instructor.

This course satisfies the General Education Criteria for a Physical Sciences course.

CRN	Type	Section	Time	Days	Location	Instructor
39315	lecture	CH	12:00 PM - 01:20 PM	TR	room 134 Astronomy Bldg	Mohr, J
39315: Camp Honors/Chanc Schol, and Physical Sciences course.						

39315: Section CH for Chancellor's Scholars only; others may only enroll with consent of instructor and the Campus Honors Program

390 Individual Study Credit: 1 to 4 hours.

Individual study at an advanced undergraduate level. Prerequisite: Consent of advisor and of staff member who supervises the work.

CRN	Type	Section	Time	Days	Location	Instructor
10396	independent study		ARRANGED			
10396: Instructor Approval Required						

401 Scientific Writing for Astro Credit: 1 hours.

Development of journal-style writing skills. Papers written in accordance with the Astrophysical Journal Manual of Style on topics approved by the instructor. Emphasis on developing adequate and critical coverage of the topic, brevity compatible with clarity, and effective presentation. Proper referencing, footnotes, and bibliography are covered. 1 undergraduate hour. Prerequisite: Concurrent enrollment in a designated 400-level astronomy course.

This course satisfies the General Education Criteria for a Advanced Composition course.

CRN	Type	Section	Time	Days	Location	Instructor
30858	conference	1	ARRANGED			Sutton, E
30858: Advanced Composition course.						
30858: Composition II course meeting with ASTR 414						

414 Astronomical Techniques Credit: 4 hours.

Introduction to techniques used in modern optical and radio astronomy with emphasis on the physical and mathematical understanding of the detection of electromagnetic radiation; includes such topics as fundamental properties of radio and optical telescopes and the detectors that are used with telescopes. Lectures and laboratory. 4 undergraduate hours. Graduate students in Astronomy will not receive credit for ASTR 414. Prerequisite: MATH 242; PHYS 213 or PHYS 214; or consent of instructor. ASTR 210 is recommended.

CRN	Type	Section	Time	Days	Location	Instructor
43741	lecture	AT	01:00 PM - 01:50 PM	MWF	room 134 Astronomy Bldg	Sutton, E
43741: 4 hours						

450 Astrochemistry Credit: 4 hours.

Same as CHEM 450. See CHEM 450.

CRN	Type	Section	Time	Days	Location	Instructor
43182	lecture-discussion	A	09:00 AM - 10:20 AM	TR	room 134 Astronomy Bldg	McCall, B

496 Seminar in Astronomy Credit: 1 to 4 hours.

Lectures on topics of current interest in astronomy and astrophysics; for advanced undergraduates and graduates. See Class Schedule for current topics. May be repeated. Approved for both letter and S/U grading. Prerequisite: Consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
45338	lecture	CAC	10:30 AM - 11:50 AM	MW	room 134 Astronomy Bldg	Ricker, P

45338: 4 hours 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.

30862	conference	S	04:00 PM - 04:50 PM	W	room 134 Astronomy Bldg	Chu, Y
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30862: 1 hours Section S: Survey of Current Research This course is for first year graduate students and advanced undergraduates interested in the research work of faculty members in Astronomy and Astrophysics. Students will meet with a different faculty member for one hour each week informally to learn about his or her scientific research work. ASTR 496 Section S is primarily meant for students who are interested in pursuing a research project with a faculty member, and the course provides good preparation for summer research assistantships. S/U grading only.

504 Theoretical Stellar Physics Credit: 4 hours.

Application of physical principles to energy generation and flow in astrophysical environments: equations of state; thermonuclear reactions; radiative transport; convection; stellar spectra; nebular spectra; evolution of both single and binary stars; compact stars; accretion disks; thermal and particle history of the universe. Same as PHYS 542. Prerequisite: PHYS 436, PHYS 427, and PHYS 486; or consent of instructor.

CRN	Type	Section	Time	Days	Location	Instructor
39318	lecture	1	02:00 PM - 03:20 PM	TR	room 134 Astronomy Bldg	Webbink, R

516 General Relativity II Credit: 4 hours.

Same as PHYS 516. See PHYS 516.

CRN	Type	Section	Time	Days	Location	Instructor
36775	lecture	A	10:30 AM - 11:50 AM	TR	room 144 Loomis Laboratory	Shapiro, S

590 Individual Study Credit: 2 to 8 hours.

Individual study or nonthesis research. May be repeated to a maximum of 16 hours. Prerequisite: Consent of adviser and of staff member who supervises the work.

CRN	Type	Section	Time	Days	Location	Instructor
10399	independent study		ARRANGED			
10399: Instructor Approval Required						

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
43745: 4 hoursComput Astrophys & CosmolComputational 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.						
43738	lecture	PC	02:00 PM - 02:50 PM	MWF	room 134 Astronomy Bldg	Fields, B
43738: 4 hoursPhysical CosmologyASTR 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 heavy 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.						
43747	lecture	SF	10:30 AM - 11:50 AM	TR	room 134 Astronomy Bldg	Mouschovias, T
43747: 4 hoursStar FormationASTR 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).

599 **Thesis Research** Credit: 0 to 16 hours.
Approved for S/U grading only.

CRN	Type	Section	Time	Days	Location	Instructor
10387	independent study		ARRANGED			
10387: Instructor Approval Required						