

AST 104 - Stars, Galaxies, and the Universe Spring 2012 Syllabus

Professor Carl Rosenzweig Physics Building Rm 319

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Office Hours: Tue. and Th. 5-6 or by appointment

Administrative questions (registration add-drop etc) contact

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Lectures: M001 Monday, Wednesday 3:45 pm - 5:05 pm Stolkin Auditorium, Physics Building

M002 Monday, Wednesday 5:15 pm - 6:35 pm Stolkin Auditorium, Physics Building

You are responsible for **all** material covered in lecture even if that material is not in your text. You are responsible for **all** announcements made at lecture and these **supersede** any information found elsewhere.

Laboratories meet in B129E in the Physics Building basement. Labs begin the week of Jan. 30.

Required Course Materials,

The Essential Cosmic Perspective by Bennett, Donahue, Schneider, and Voit, 6th Edition, 2012,

Alternative: *Investigating Astronomy* by Slater and Freedman. If you already own this text from AST101 you don't need to purchase *Essential Cosmic Perspective*. Parallel readings are assigned from this text.

Stars, Galaxies and the Universe : (Lecture Tutorials for Introductory Astronomy, by Prather, Slater, Adams, Brissenden, This is a custom version of Lecture Tutorials. Even if you have a Lecture Tutorial book from AST 101 you **must** purchase this. **We will use the tutorials often. Bring this book to every lecture.**

Mastering Astronomy Access Kit (bundled with text or available for purchase online <http://www.masteringastronomy.com/> Your access from AST 101 F'11 should work.

Course Objectives

By the end of the semester, all AST 104 students should gain

1. the notion that the world is knowable, that we may learn about it through observations, experiments, and theory via the scientific process.
2. the notion that physical laws are universal, with the behavior of the largest objects in the universe governed by the behavior of its smallest objects, such as atoms and electrons.
3. an understanding of how we measure the mass, temperature, brightness, composition, distance, and motion of stars.
4. an understanding of how matter is grouped in galaxies, and of the evidence that most matter cannot be seen with light.
5. an understanding of how stars, galaxies, and the universe itself change with time, of how we know, and of what we still don't know.
6. a cosmic perspective -- an understanding of the nature and structure of the universe.
7. the ability to express these ideas to other people.

Many key astronomical ideas can be grasped visually, so we'll spend time looking at a variety of pictures and maps of the sky. We won't use complicated mathematics, but we will speak the language of numbers. Numbers carry a lot of the meaning in astronomy. You will also need to use a few simple formulas, and to interpret graphs. We use no mathematics above the high school math that is a prerequisite for acceptance at SU. We occasionally use a little algebra but no trigonometry or calculus.

LECTURES

Prof. Rosenzweig will give the course lectures. Attendance is *required*. Material will be covered in the lecture that is not available elsewhere. 10-40% of each exam will be drawn from such material. Questions during lecture are welcome. You are **responsible for all** announcements **made during lecture**.

Careful study of the textbook is *required*. The lectures focus on difficult aspects of astronomy, provide structure for your out-of-class study, and demonstrate concepts we encounter. You are accountable for **all** material, concepts, and interrelationships presented in the lectures, the text, and the Lecture Tutorials. Reading assignments should be completed before the class they are listed with. Otherwise, the lectures and labs will be less useful in helping you develop a deep understanding of the subject. It is important to remember that the exams cover **all** material from the text readings even if not discussed in class.

Class participation exercises, will be assigned in lecture and collected from time to time in lectures. They are the basis for course participation credit (**5%**).

Conceptual questions will be asked in class to assess your understanding. You will answer multiple-choice questions by holding up a folded sheet showing your choice. (a "paper clicker"). These questions are similar to those on exams, so active lecture participation will be an effective way to learn (and prepare for exams). You will be given a "paper clicker". Bring it to class each day (I suggest keeping it in your LT book)

LECTURE TUTORIALS (LT)

It is our belief that you can only learn a limited amount of information from the lectures alone, no matter how clear or entertaining. Therefore lectures are augmented by **collaborative** classroom activities called Lecture Tutorials (LT). The LT activities target specific ideas presented in lecture and are designed to be completed in small groups (2 to 4 students) by **talking through the questions** and writing a detailed, consensus response. **We will use the LTs regularly in lectures**. The LTs completed in class will not be submitted for grading. However the LT questions are quite similar to the questions you will find on exams. You should consider the LTs to be a **critical** component of your success in the course. You are strongly **encouraged** to **discuss** your solutions with your **peers** and not work alone on the LTs. Written solutions to the LTs will **not** be provided; this undermines the purpose of the LTs and turns them into just another textbook. However, you are **encouraged** to discuss your solutions with your peers, your TA, in physics clinic or with Prof. Rosenzweig in office hours if you would like feedback on your work. The LTs are available at the bookstore and they **must be brought to every lecture**.

ONLINE HOMEWORK

On-line homework will be due each week and must be submitted by early Monday morning (about 5AM) following their assignment. Thus you will have one full weekend to finish the homework. Homework will count as **12.5%** of your total grade. We are using the *Mastering Astronomy* online platform, which represents the most sophisticated on-line system for astronomy tutorials and self-study. The first homework exercise will familiarize you with the interface. The other homework will help ensure that you are keeping up with the material in the class. You should have received a Student Access Kit to Bennett et al.'s *The Essential Cosmic Perspective* with your textbook or from AST101. The Mastering Astronomy course ID for this course is

AST104ROSENZWEIG2012

Make sure to **register with your net ID** code (letters before the @ in your SU email address, e.g. my.net ID is crosenzw) when you are prompted. **If your ID is not entered or mistyped you will not get credit for**

your homework so BE CAREFUL. Each assignment will be available the week before it is due. Late homework will not be accepted so make sure you submit it on time.

LABORATORIES

Laboratory sections meet in room B129E in the basement of the Physics Building. There are 8 scheduled laboratories beginning the week of **Jan. 30**. Check course calendar for the exact schedule. You will perform measurements and observations, discuss key ideas and questions, and interpret and analyze scientific evidence. Attending your regular laboratory meeting is crucial. The lab counts for **22.5%** of your total grade. **If you miss 3 or more labs you will receive a 0 for the lab grade for this course.** You will work in a team of three students, but you must write answers in your own words unless specified otherwise. Assignments must be handed in at the end of each lab. If you know you will miss your lab section in a given week, you should arrange ahead of time to attend another section: inform **both** your regular TA and the TA of the section that you wish to attend. The TA will allow you to switch sections if you have a valid excuse (and possibly if you don't) so long as there is space in the section. It is your responsibility to make sure that your official TA receives the lab report you submit. For some laboratory exercises, calculators are recommended. There will be a make-up lab the last week of class for those who have missed a lab.

COURSE CONDUCT

You are expected to show respect for your fellow students and to help provide a good learning environment for them. Please turn off cell phones before you enter the classroom (or the lab). Please do not arrive late nor leave class early (unless you have talked to the instructors in advance and arranged to sit on an aisle). Please refrain from having side conversations that may disturb or distract students near you. Simply put, please don't do anything that will get in the way of your fellow students' learning.

EXAMS

There will be three exams during the semester tentatively scheduled for **Feb.13, March 7, and April 9**. Each exam will count as 30 points. The final will be on **Friday May 4** from 3 until 5 PM. It will count as two exams for 60 points. I will drop your lowest score. If the final is your lowest score I will count it only once. **THERE WILL BE NO MAKE-UP EXAMS.** A missed exam will count as your lowest score and will be dropped. Exams count as **60%** of your final grade

GRADING

Grades will be calculated based on your scores on various course activities, in the following proportion

* Lab Exercises: maximum =	45 points
* 4 highest exam grades: maximum =	120 points
* Homework: maximum =	25 points
* Class participation: maximum =	10 points
Maximum possible score	200

It is important that you keep track of your grades (especially in the labs) throughout the semester. You will be able to access your up-to-date grades using Blackboard <<https://blackboard.syr.edu/webapps/login>>.

Your final course grade will be determined from your total score at the end of the semester.

An **A-** will require **180** (90%)points and a passing grade will be **115** (57.5%) points

We stress that you are not in competition with your classmates and you should help each other; we will be very happy if everyone learns the material well enough to earn an A.

During these closed-book, close-note exams, you must bring a photo ID and sit in your assigned seat (posted outside Stolkin). You are not allowed to wear headphones or communicate with anyone in the classroom

except for the course instructors and exam proctors. All electronics (cell phones, calculators, etc.) must remain off and stowed at all times during exams (the proctors will have cell phones on in case of an Orange Alert, in accordance with University policies).

Academic Integrity

The Syracuse University Academic Integrity Policy holds students accountable for the integrity of the work they submit. Students should be familiar with the Policy and know that it is their responsibility to learn about instructor and general academic expectations with regard to proper citation of sources in written work. The policy also governs the integrity of work submitted in exams, in laboratories, and in assignments, as well as the veracity of signatures on attendance sheets and other verifications of participation in class activities. Serious sanctions can result from academic dishonesty of any sort. For more information and the complete policy, see <http://academicintegrity.syr.edu>

Academic Accommodation

Students who are in need of disability-related academic accommodations must register with the Office of Disability Services (ODS), 804 University Avenue, Room 309, 315-443-4498. Students with authorized disability-related accommodations should provide a current Accommodation Authorization Letter from ODS to the instructor and review those accommodations with the instructor. Accommodations, such as exam administration, are not provided retroactively; therefore, planning for accommodations as early as possible is necessary. For further information, see the ODS website, Office of Disability Services
<<http://disabilityservices.syr.edu/>>

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804 University Avenue Room 309
Syracuse, New York 13244-2330
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TOO: (315) 443-1371
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Other Information

Stars, Galaxies and the Universe is a course in which you will be doing astronomical observations as well as some hands on experiments and measurements. You can use this course to satisfy the requirement of the liberal arts core for one laboratory science course.

Astronomy 101 is not a prerequisite; AST 101 and AST 104 can be taken independently or together in either order. Taking both AST 101 and AST 104 (in any order) fulfills the requirement of the liberal arts core for one science sequence.

To support laboratory experiments and lecture demonstrations you have been charged a course fee of \$30. This fee helps pay for (i) handouts which are distributed to you, (ii) supplies, small pieces of apparatus, and maintenance for the laboratory, (iii) supplies and apparatus for lecture exercises and demonstrations, and (iv) undergraduate students working in the demonstration laboratories.

Astronomy 104, Stars, Galaxies, the Universe

Course Calendar, Spring 2012

Readings are in Essential Cosmic Perspective (E). *Alternate* readings are listed in Investigating Astronomy (I). Figures and figure captions, Common Misconceptions, etc. are an integral part of the reading assignments. There is a WEEKLY homework assignment to be found and completed on the MASTERING ASTRONOMY web site

Date	Topic	Assignments/Lab for Week	
Wed. Jan. 18	<i>Introduction; Powers of 10</i>	Reading	E pp. 1-21; Appendix A4-A7 I pp. 4, 68,A8-A9 LAB No Lab
Monday, Jan. 23	<i>How Far is a Star?</i>	Reading	E pp. 309-311 I pp. 236-239 LAB No Lab this week
Wed., Jan. 25	<i>Light</i>	Reading	E pp. 311-312; 111-114 I pp. 34-39; 234-236
Monday, Jan. 30	<i>How Hot is a Star?</i>	Reading	E pp. 121-123 I pp. 41-44 LAB Distance Measurements
Wed, Feb. 1	<i>Spectra</i>	Reading	E pp. 116-121; I pp. 44-50
Monday, Feb. 6	<i>Doppler Shifts</i>	Reading	E pp. 123-125;316-317 I pp. 50-51 LAB Spectra
Wed, Feb 8	<i>Laws of Motion</i>	Reading	E pp.85-94 I pp.79-82
Monday, Feb. 13	EXAM I	LAB	No Lab this week
Wed., Feb. 15	<i>Gravity</i>	Reading	E pp. 68; 98-102; 94-98 I pp.78-79; 81-84
Monday, Feb. 20	<i>Stars Hertzsprung-Russell diagrams</i>	Reading	E pp. 311-323 I pp. 240-252 LAB No Lab
Wed., Feb. 22	<i>Star Clusters: HR diagrams</i>	Reading	E pp. 323-328 I pp.263-269
Mon., Feb. 27	<i>Star Birth</i>	Reading	E pp.333-340 I pp.257-263 LAB Understanding Stars
Wed., Feb. 29	<i>Life of a Low Mass Star</i>	Reading	E pp. 340-346 I pp. 269-278
Mon., March 5	<i>High Mass Stars;Supernova</i>	Reading	E pp. 346-356 I pp. 288-294 LAB Star Cluster Distances
Wed., March 7	EXAM II		

March 14	SPRING BREAK		ENJOY
Mon. March 19	<i>White Dwarfs; Neutron Stars</i>	Reading LAB	E pp. 362-371 I pp. 278-279; 294-297; 302-306 No lab this week
Wed. March 21	<i>Black holes</i>	Reading	E pp. 372-378; 365 I pp. 297-302
Monday, March 26	Milky Way	Reading LAB	E pp. 387-391, 396-400 I pp. 312-323; 327-329 Galaxies
Wed, March 28	<i>Birth of Milky Way, Center: Galaxies</i>	Reading	E pp. 401-405; 411-416 I pp. 340-342; 363-367
Monday, April 2	<i>Hubble Expansion</i>	Reading LAB	E pp. 416-425 I pp. 347-349; 372-377 No lab this week
Wed., April 4	<i>Quasars</i>	Reading	E pp. 426-437 I pp. 359-363
Monday, April 9	EXAM III	LAB	Hubble Expansion
Wed. April 11	<i>Dark Matter</i>	Reading	E pp. 444-455 I pp. 323-326; 357-359
Monday April 16	<i>Structure in the Universe</i>	Reading LAB	E pp. 455-458 I pp. 349-353; 364-367 Dark Matter
Wed, April 18	<i>Big Bang</i>	Reading	E pp. 471-480 I pp. 377-383;
Monday, April 23	<i>Inflation</i>	Reading LAB	E pp. 481-491 I pp. 383-385 Structure in the Universe
Wed., April 25	<i>Dark Energy</i>	Reading	E pp. 459-463; 490-493 I pp. 385-390
Monday, April 30	<i>Life in the Universe</i>	Reading LAB	E pp. 504-510; 514-525 I pp. 194-196; 200-203 Make Up Lab Dark Energy
Friday, May 4	FINAL		3:00 -5:00 PM