Astronomy 110G: Introduction to Astronomy
Spring 2013

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I Overview of the course

You are about to begin discovering our galaxy and universe! You will not be memorizing facts and definitions or formulae, but participating in scientific inquiry by questioning yourself, your peers, and hopefully your instructor. The best way to learn scientific principles and concepts is to act like a scientist, like an astronomer, and not listen to lectures all day. That is what this class will be. It will be challenging, but not in the sense that the exams will have ultra-hard problems. It will be challenging in the sense that you'll have to think, argue, be intellectually engaged, and remain open minded and creative. You will not *only* be able to rely on your memory skills to do well. These may or may not be things to which you are accustomed, but you pay good money to go to university, and these are the things that matter in the real world. Astronomy, and the principles it teaches, is very relevant to the real world. I have high expectations for you, but I am committed to helping you reach them!

The way we hope to accomplish this, in practice, is through inquiry-based learning activities, peer instruction, intensive reading of material **before** it is presented in class, and formulating your thoughts through writing. You will not be told what astronomy is, you're going to figure it out yourself. I may spend some time with mini-lectures on the most difficult topics, but you will mostly be engaging in higher-level activities within groups. This type of class structure has been shown to help students learn ideas more deeply and to retain them longer.

Below are the learning goals and outcomes for ASTR 110G. I want you to acquire a skill set, to have a different attitude/appreciation of astronomy, to be able to think critically – all the things that would separate you from a student who did not take Astronomy 110G.

a Course learning goals

- **General Understanding**: You will be comfortable (and eager) going outside and looking up in the sky and generally understanding all the things you observe.
- **Reasoning**: You will improve your reasoning and critical thinking skills through discussions with your peers and working on difficult concept questions.
- **Current Science**: You will be able to read and understand a popular journal or newspaper article or a general colloquium about topics dealing with stars and galaxies and basic astronomy.
- **Teamwork**: You will be doing a lot of group work in this course and honing your communication skills and listening skills is extremely useful and important.
- **Enthusiasm**: You will become enthusiastic about astronomy and science, not afraid of it.

b Course learning outcomes

- *Recognize* that the only thing we can use to learn about astronomical objects is their light (either reflected or radiated)

- Be able to *explain* to others in a simple way at least one feature of the sky (e.g., the phase of the Moon at any time in the month, when it rose, and when it will set, etc.)
- *Provide* as much information as possible of how we interpret the light and images we obtain from an astronomical object
- *Give examples* how studying the Sun helps us understand other stars in the galaxy
- *Relate* how basic physical principles that we can easily study here on Earth (like gravity, conservation principles, atomic physics, etc.) allows us to gather information from far away astronomical objects and events
- *Prepare* written laboratory reports that record observations, indicate analysis, and present conclusions

II Boring details of the course

a Prerequisites

There are no prerequisites for taking this course. Any mathematics you may need will be introduced along the way. This is a 4 credit course. It's fun too.

b Textbook and materials

- **Textbook**: *21st Century Astronomy - Stars and Galaxies* (3rd Edition), by Hester, Smith, Blumenthal, Kay, and Voss (2010). The textbook can be purchased in the campus bookstore. You might be able to find a cheaper option for the book online.

  The publisher's site for your textbook[1] allows you to access several things (using the 4 horizontal tabs near the top of the page). The main thing is a **free** resource called StudySpace, which lets you take practice quizzes for each chapter, look at flash cards, or study simulations and animations of important topics. It's highly recommended to explore StudySpace for extra material, as well as current astronomy news stories. There are also some animations available (AstroTours) about important topics, and recent astronomy news items.
- **Lab manual**: You have 3 options: (1) There is a lab manual at Kinkos near campus on sale for about $35 (make sure it's the ASTR 110 manual, not ASTR 105). You are warned that not all of the labs you will be doing are in this manual (and similarly, not all labs in the manual will be used). (2) Or, you can download the manual here[2] and print the relevant labs you need each week. Labs we will do that are not in the manual will be provided as .pdf files beforehand that you can print. (3) Finally, you can print .pdfs of the labs from the lab webpage maintained by the course Teaching Assistant.[3]
- **Course homepage**: I have created a course webpage[4] that contains all the lecture notes and assignments and files. It is just easier to do these things on a "traditional" website than on Canvas, trust me! Canvas will only be used as a confidential register of your grades. You should check this website all the time.
- **Other useful resources**: `astronomynotes.com`. A website with tons of information and demos for all things astronomy.

c Time and location

Classes will meet on Tuesday and Thursday at 11:45 – 1:00, and are to be held in the Biology Annex (BX) 102.

There are 2 lab sections, both on Thursday afternoon and both held where we meet for class, Biology Annex 102. **M07**: Thursday, 1:30 – 3:30. **M08**: Thursday, 3:30 – 5:30.

[1] http://www.wwnorton.com/college/astronomy/21st-century-astro3/
[2] http://astronomy.nmsu.edu/astro/Labmanual2013.pdf
[3] http://astronomy.nmsu.edu/rnath/Astr110G/
[4] http://astronomy.nmsu.edu/jasonj/110/

d Instructor

Jason Jackiewicz. **Office**: 106 Astronomy building. **email**: jasonj "at" nmsu.edu. **phone**: 575.646.1699.

e Teaching assistant

The teaching assistant will direct the laboratory sections and assist with some of the course grading. He will also be available for help during his office hours.

Rakesh Nath. **office**: 110 Astronomy building. **email**: rnath "at" nmsu.edu. **phone**: 575.646.2107.

f Office hours

My fixed office hours will be **3:00 − 5:00 on Tuesdays**. If you cannot make it to see me during these times, please contact me to set up another schedule to accommodate your needs. Office hours may be crucial for you to get things corrected that you didn't understand in class. Don't waste the opportunity to talk to the person who writes your exams!

g Course schedule and assignments A, B, C

Table 1 is the most important section of the syllabus to understand. Since you will be doing a lot of reading prior to the introduction of the material in class, our precious class time together will be used for higher-level learning and discussions. To do that effectively, it is imperative that we follow the procedure laid out in this section.

Assignment A: This is the reading assignment from the book and associated written part. This will typically be due on Tuesdays at the beginning of class, one class period before the material is discussed. Each Assignment A will have 4 parts:

(a) Read the assigned material. Reread as needed for complete understanding. Then write clear responses to assigned questions about the reading.

(b) Write down some of your own explicit questions about your reading, ready to bring up in class. This may involve new or old concepts that are confusing to you, and connections to other ideas. You should also consider writing down what was well explained and interesting, what was confusing, what you had to reread but eventually understood.

(c) Reflection: Write two or three sentences reflecting on the process of your work; this should only take a few minutes. Write about how things went with any assignment or reading done for class, and other course work. This should reflect both your ongoing personal feelings about the course as a whole and your interaction with the material at hand. Be honest.

(d) Write how much time you worked on part (a).

Assignment B: These are several short "warm-up" questions from the text or elsewhere that will be assigned one class prior to when we discuss the new material. Typically these will be done on Thursday in class and handed in the same day. You will probably get to show the class on the blackboard how you solved some of these problems.

Assignment C: More complex questions about the book or discussions, only assigned after going over the new material. These can be worked on individually and with others in your group. I am happy to help during office hours as well. Your assignment, however, should be entirely your own writing. Often you can get these done during class hours on Tuesday.

So here's a typical class week. Let's starts on a Thursday. New material is always presented on Thursdays, and finished on the following Tuesday, let's say it's unit 4 today. This means that next Thursday we will begin unit 5. To be prepared for next Thursday, you will need to do assignments on unit 5 material *before* next Thursday's class. So on Tuesday, reading questions (Assg. 5A) will be due at the beginning of class. On that same day, you

Table 1: Course assignment schedule (somewhat tentative). The assignments A, B, and C are described in Section g.

Week of	**Unit #**	**Assignment # Due**
Jan. 14	.. T	*
	0 Th	*
Jan. 21	0 T	1A *
	1 Th	1B *
Jan. 28	1 T	1C 2A *
	2 Th	* 2B *
Feb. 4	2 T	2C 3A *
	3 Th	* 3B *
Feb. 11	3 T	3C 4A *
	4 Th	* 4B *
Feb. 18	4 T	4C 5A *
	5 Th	* 5B *
Feb. 25	5 T	5C 6A *
	6 Th	* 6B *
Mar. 4	6 T	6C 7A *
	7 Th	* 7B *
Mar. 11	7 T	7C 8A *
	8 Th	MID-TERM EXAM
Mar. 18	9 T	8BC 9A *
	9 Th	* 9B *
Mar. 25		**SPRING BREAK**
Apr. 1	10 T	9C 10A *
	10 Th	* 10B *
Apr. 8	11 T	10C 11A *
	11 Th	* 11B *
Apr. 15	12 T	11C 12A *
	12 Th	* 12B *
Apr. 22	13 T	12C 13A *
	13 Th	* 13B *
Apr. 29	14 T	13C 14A
	14 Th	* 14B
May 6		**FINAL EXAM (May 7, 10:30am)**

will also need to work on the more advanced questions from the current unit (Assg. 4C) in class. On Tuesday, you hand in 5A and we work in class on 4C, which will be handed in at the end of class. This is the last day we discuss unit 4. When we get to Thursday, you will get back your graded 5A (that you handed in on Tuesday) and the class will be structured based on how you did on it. Assignment 5B will be then worked on in class that Thursday (and 6A will be assigned). The whole cycle repeats. Got it? You'll pick this up quickly, don't worry!

These assignments are to be typed or *clearly* handwritten and **handed in** at class time, not emailed! These three assignments are equally weighted and worth 50%, half of your overall grade!

Tentative unit topics include: 1. Patterns in the sky; 2. Seasons, phases, and eclipses; 3. Light and what it tells us; 4. Making use of light; 5. Telescopes; 6. Basics of stars; 7. The Sun; 8. Evolution of low-mass stars; 9. Evolution of high-mass stars; 10. The expanding universe; 11. Cosmology; 12. Structure in the universe; 13. Galaxies; 14. The Milky Way.

h Labs

Labs are an extremely important component of this course, and are not really that different than "lecture," since you will be working in groups and figuring out things for yourselves.

Labs are held once per week. The assignments in the lab manual are due at the *beginning* of the following week's lab class, unless otherwise noted by the assistant. You must attend all scheduled labs – if you have to miss a lab, please come and see your teaching assistant at least **1 week** before that lab takes place to schedule a make-up assignment.

You are required to read through the laboratory unit **before** you arrive to the session, and a short quiz on the material of each week's lab may be given at the beginning by the TA. Being prepared before you arrive will help both you and the TA get through the lab on time.

The preliminary schedule of the labs can be found on the TA's website.[5]

i Exams

There will be 2 (cumulative) exams during the semester totaling 20% of your final grade. The tentative date for the mid-term exam is indicated in the "important dates" section below.

j Observatory

During the semester you will be given the chance to visit the campus observatory[6] to observe several interesting objects in our solar system and beyond. There will be two separate occasions to view two different sets of objects in each "half" of the semester. It is an exciting opportunity to take advantage of our great facility. These assignments will count toward your lab grade. You will bring printed out, blank observatory sheets[7] to the observatory to sketch your observations. These will subsequently be handed in to your TA. The schedule of the open hours of the observatory can always be found on its webpage, but this semester it will be Mondays and Wednesdays 9:00 – 10:00 pm. Stay tuned for more details.

k Grading

We will use the following grading distribution:

Assignments A,B,C	50%
Lab exercises	25%
Exams (2)	20%
Class participation	5%

- Note that your class participation is very important for understanding the material. If you are shy and do not enjoy speaking in class, email me your thoughts and questions.
- Results of exams, quizzes, and homeworks may or may not be "curved": this will be determined on a case-by-case basis. If it is decided that a curve will be used, it will be explained to you when the assignment results are discussed. Note that the plus/minus grading system will be used for your final grades: A (>92), A^- (90-92), B^+ (87-89), B (83-86), B^- (80-82), C^+ (77-79), C (73-76), C^- (70-72), D^+ (67-69), D (63-66), D^- (60-62), and F (<60).

l Important dates

- **March 12**: Last day to drop course with "W" (withdrawal)

[5] http://astronomy.nmsu.edu/rnath/Astr110G/schedule.html
[6] http://astronomy.nmsu.edu/astro/observatory/
[7] http://ganymede.nmsu.edu/astro/observatory/Campus_Observatory_Sheet.pdf

- **March 14**: MID-TERM EXAM (tentative)
- **March 25-29**: Spring Break
- **Tuesday, May 7**: FINAL EXAM, 10:30 - 12:30 am

III Other policies and notices

1. Attendance to the lectures is mandatory: you will not do well at all if you miss this class. Come to class, you'll have fun! It would be very courteous to let me know **ahead of time** if you will miss class for a valid reason (call, send an email, come visit, etc.). Unexcused absences tell me that your commitment to the course is not strong enough, and your grade will reflect that. **Make ups for any assignments or exams will only be considered if I am contacted ahead of time and presented a reasonable excuse for class absence**.
2. You must enlist in one of the lab classes – it is mandatory. Attendance to those is also mandatory.
3. Voting on all questions with your voting card is mandatory.
4. **Cellphones must be turned off and completely hidden for the duration of the class period**. *Texting* will not be tolerated - I will certainly "borrow" your cellphone if I see it, until the end of class. I may even use it to call friends in Italy. And those Italians can talk and talk. Think of it this way, if you were teaching would you want your students to be sending messages? Do you want me to use a cell phone during a class you're paying for? Laptops will only be permitted in class if that is your preferred method of taking notes, although it is encouraged to use notebooks instead since you will need to make drawings and write equations.
5. **Cheating** and **plagiarism**, while not only uncool, unfair, and unnecessary, will be punishable according to the procedures demanded by the University and spelled out clearly in the student code of conduct handbook.[8] The penalites[9] are severe and not worth it, so just simply do not cheat or plagiarize. When in doubt, give credit by appropriate citation.

   Official definition: Plagiarism is using another person's work without acknowledgment, making it appear to be ones own. Intentional and unintentional instances of plagiarism are considered instances of academic misconduct and are subject to disciplinary action such as failure on the assignment, failure of the course or dismissal from the university. The NMSU Library has more information and help on how to avoid plagiarism at http://lib.nmsu.edu/plagiarism/.
6. If you have any problems whatsoever – grading mistakes, attendance issues, anything – just come see me and we'll try to work things out.
7. If you seek academic tutoring or student advice, please visit the student success center at http://ssc.nmsu.edu/zuhl/.
8. Official communication to you will often come through your NMSU e-mail. Please access it regularly, or forward it to your currently used email service, as your success in college may ride on your ability to respond quickly.
9. Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act (ADA) cover issues relating to disability and accommodations. If a student has questions or needs an accommodation in the classroom (all medical information is treated confidentially), contact: Trudy Luken, Student Accessibility Services (SAS) - Corbett Center, Rm. 244, Phone: 646.6840. E-mail: sas "at" nmsu.edu. Website: http://www.nmsu.edu/∼ssd/
10. NMSU policy prohibits discrimination on the basis of age, ancestry, color, disability, gender identity, genetic information, national origin, race, religion, retaliation, serious medical condition, sex, sexual orientation, spousal affiliation and protected veterans status. Furthermore, Title IX prohibits sex discrimination to include sexual misconduct, sexual violence, sexual harassment and retaliation. For more information on discrimination issues, Title IX or NMSU's complaint process contact: Gerard Nevarez or Agustin Diaz, Office of Institutional Equity (OIE) - O'Loughlin House, Phone: 646.3635. E-mail: equity "at" nmsu.edu. Website: http://www.nmsu.edu/∼eeo/

[8] http://www.nmsu.edu/%7Evpsa/SCOC/misconduct.html
[9] http://www.nmsu.edu/%7Evpsa/SCOC/actions.html