Astronomy 301V: Revolutionary Ideas in Science
Spring 2011
Syllabus

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January 17, 2011

I Overview of the course

Welcome to the study of revolutionary ideas in science! You will be reading a lot, talking a lot, giving your feedback constantly, making distinct conclusions yourself, and trying to convince others you're right.

The way we hope to accomplish this, in practice, is through inquiry-based learning activities and peer instruction. You are going to figure out things for yourself, or with the help of your classmates.

Below are the learning goals and outcomes expected for this course. Instead of using the table of contents of some textbook and saying "I want you to know Kepler's Laws at the end of the semester ...", I'd rather you leave this course in a different way. I'd rather you acquire a skill set, to have a different attitude/appreciation of science, to be able to think critically – all the things that would separate you from a student who did not take Astronomy 301. Therefore, this course is based around learning objectives, not topics.

a Course learning goals

- **Scientific literacy**: Increase your overall literacy and confidence in science and its language
- **Teamwork**: Learn to work effectively in teams/groups
- **Reasoning**: Improve reasoning and critical thinking skills
- **Current science**: Be able to understand a popular journal article or a general colloquium about any broad scientific topic
- **Enthusiasm**: Become enthusiastic and excited (not afraid) about past, current, and any future scientific discoveries and breakthroughs

b Course learning outcomes

- *Paraphrase* the general steps of the scientific method and *identify* one example of its use in history
- *Apply* scientific principles to certain "pseudosciences" (like astrology perhaps) and *interpret* the scientific rigour of the outcome

- *Contrast* and *compare* the various reasons and evidences of why we think the age of Earth is what it is and *evaluate* some of the theories that somehow disagree with this age
- *Summarize* some of the arguments for and against man-made global warming
- *Give examples* of why we think the universe formed from the Big Bang and *differentiate* between steady and expanding theories of cosmology
- *Prepare* and *organize* written and oral arguments, observations, and analysis for a scientific theory, especially for one you do not personally find true

Each chapter or unit will also have its own set of learning goals and outcomes that you will receive. These outcomes implicitly give you an idea of what will be on the exams. For this course, only material that directly supports the learning outcomes is important.

II Boring details of the course

a Prerequisites

Any 100-level general education science course. The mathematics you may need will be introduced along the way. This is a 3 credit course.

b Textbook and materials

- **Textbook**: Lucky you, there is no required textbook! You will be given an assortment of handouts of readings and/or links to online readings.
- **Newspaper**: The New York Times on Tuesday publishes a science section. You are required to bring that to class each Wednesday (don't forget to pick it up Tuesday!!), having read the articles, and we'll talk about it together. I will ask you questions about the articles, and possibly make quizzes too. You can find free copies of the New York Times all over campus. Grab one early Tuesday in the morning so they're not all gone. If you need help locating a NYT dispenser, let me know. If you forget to get it, you can always read that section in its entirety online at nytimes.com.
- **Course homepage**: We will use 2 homepages for this course. Blackboard will be used for your grades, announcements, and any online quizzes you will need to complete. In addition, I have created a course webpage[1] that contains all the lecture notes and possibly some analysis of your quiz and exam scores. It is just easier to do these things on a "traditional" website than on Blackboard.

c Time and location

Classes will meet on Monday and Wednesday afternoons at 1:30 – 2:45, and are to be held in Gardiner Hall (CB) 229.

d Instructor

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

[1] http://astronomy.nmsu.edu/jasonj/301/

e Teaching assistant

Elizabeth Klimek. **Office**: 212 Astronomy building. **email**: eklimek "at" nmsu.edu. **phone**: 575.646.3000. Liz will be available for any questions outside of class, as well as help out with grading and other course components.

f Office hours

My fixed office hours will be 5:00 – 6:00 on Monday and Wednesday. If you cannot make it to see me during these times, please come and see me to set up another schedule to accommodate your needs.

Also, you have the opportunity to communicate questions to me by instant messaging from your computer. My screen name is **jasonjnmsu** for google chat, yahoo, aim, facebook, and **jasonjnmsu@live.com** for msn services. If there is an instant messaging service that you use that is not listed here, let me know. On Blackboard there is a chat capability, you can often find me on there.

g Homework

Homework will be assigned on a regular basis and is probably the most important and necessary component of the course to strengthen your understanding of the material. Many homework assignments will be essay-types. One other component of homework based on readings will be due **before** class where you answer a few short questions on blackboard. Written assignments will be due at the **beginning** of the lecture on the due date, as will assignments that need to be emailed for credit. **Note**: You will lose 5% each day your assignment is late for the first 2 days, and 10% per day thereafter. Thus, after 6 days your maximum score is only 50% $\rightarrow$ try to get your homework in on time! Depending on how many homeworks are scheduled, you may have the chance to drop one or two of your lowest scores.

h Quizzes

Once in a while you will be given short quizzes to test a particular idea, and these may be nothing more than a particular homework problem. The quizzes will typically be announced ahead of time, but may be unannounced if I feel that attendance is not what it should be. It is likely you will have the chance to drop your lowest quiz grade.

i Project

Each student will take part in a major group project. Your grade will be based both upon the group's overall performance and your individual contribution to the group. Details will be given later in the semester.

j Exams

There will be 2 exams during the semester totaling 35% of your final grade. The tentative date for the midterm is indicated in the "important dates" section below.

k Grading

We will follow the following grading distribution:

Class participation	5%
Quizzes	20%
Project	20%
Homework	20%
Exams (2)	35%

- Note that your class participation is very important for understanding the material. It is effectively more than the 5% shown above, since it will affect all the other components of your grade.
- 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 8**: Last day to drop course with "W"
- **March 16**: First EXAM (tentative)[2]
- **March 21 – 25**: Spring break - no classes
- **Monday, May 2**: FINAL EXAM, 1-3pm

III Topics to be covered in the lectures

This course will be structured around several big ideas that will allow you to analyze and understand the details of scientific revolutions and their consequences. We will begin by

Below is a rough list of the main topics that will be encountered in the course and the approximate time frame. The detailed course schedule, along with all assignments and .pdf files of course lectures, can always be found on Blackboard. The schedule below is subject to change (with warning).

- **Weeks 1 – 4: View of the Solar System**. Here we will study the archetypal revolution and example of how science progresses - the **Copernican Revolution**. This will introduce us to figures such as *Ptolemy*, *Galileo*, *Brahe*, and, of course, *Nick Copernicus* himself. Once we learn about this we will be ready to tackle things and recognize things not necessarily scientific, such as *astrology* and *UFO sightings*, etc. You will use critical thinking skills in all of these efforts.
- **Weeks 5 – 8: Mystery of the Earth**. We will look at *geology* and the revolutionary theory of **plate tectonics**. This will enable us to explore questions about the age of the Earth using things such as *radioactive dating*. Another important aspect of the Earth touches on the *evolution of life* and **impacts and mass extinctions**. For example, what killed the dinosaurs? Finally, we will try to come to grips with theories of global warming and energy use.
- **Weeks 9 – 12: View of the Universe**. Moving now to greater distances from Earth, we will study theories of **Cosmology** such as the *Big Bang* and the **expanding** vs. **steady-state** universe. Once we understand the basics, we can explore theories of *multiverses* which are supported by many prominent scientists.

[2]Subject to change

- **Weeks 13 – 15: Random topics**. The last part of the semester will cover a range of topics such as impacts on the Earth (such as meteorits) and their effects on the planet, atmospheres, weather, and climate change in the solar system, the search for intelligent life, and multiple universe theories. We can find many ideas about these topics in journals and newspapers.

IV Other policies and notices

1. Attendance to the lectures is mandatory: you will not do well at all if you miss this class. Attendance will be taken at random times to determine a student's credit when the time comes to submit final grades. If you happen to be absent 2 times, and those are the only times I take attendance, that's tough luck. 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. Another important reason to attend class is to take any unannounced "pop" quizzes that I like to give. **Make ups for any quizzes or exams will only be considered if I am contacted ahead of time and presented a reasonable excuse for class absence**.
2. Voting on all questions with your voting card is mandatory.
3. The last day to drop a course with a "withdrawal" is March 8.
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.[3] The penalites[4] are severe and not worth it, so just simply do not cheat or plagiarize. When in doubt, give credit by appropriate citation.
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 address, as your success in college may ride on your ability to respond quickly.
9. Feel free to call Jerry Nevarez, Director of Institutional Equity, at 575-646-3635 with any questions you may about NMSU's Non-Discrimination Policy and complaints of discrimination, including sexual harassment.
10. Feel Free to call Michael Armendariz, Coordinator of Services for Student with Disabilities, at 575-646-6840 with any questions you may have on student issues related to the Americans with Disabil-

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

ities Act (ADA) and/or Section 504 of the Rehabilitation Act of 1973. All medical information will treated confidentially.