Astronomy 109-09 Fall 2014 Laboratory Syllabus

Meeting Time: Wednesday 2:00 pm – 4:40 pm
Meeting Location: PA 215
Schedule Number: 20316

Instructor: Josh Mascoop
Office: PA 228
Contact Email: jmascoop@gmail.com
Phone: 617-529-1104

Office Hours: Tuesday 12:00 pm – 2:00 pm in PA 215A

Class Website: http://blackboard.sdsu.edu

Text: Astronomy 109 Lab Manual by Department of Astronomy, SDSU

Prerequisite: ASTR 101 (or currently enrolled)

Required Materials: Astronomy 109 Lab Manual (from SDSU bookstore for ~$30), scientific calculator, paper, pencil, or pen (no red ink)

Description
Demonstration of astronomical principles through observations with astronomical instruments and analysis of astronomical data. A nighttime field trip to Mount Laguna Observatory is required.

The Role of Astronomy 109 in San Diego State University’s General Education Program
This course is one of nine courses that you will take in General Education Foundations. Foundations courses cultivate skills in reading, writing, research, communication, computation, information literacy, and use of technology. They furthermore introduce you to basic concepts, theories and approaches in a variety of disciplines in order to provide the intellectual breadth necessary to help you integrate the more specialized knowledge gathered in your major area of study into a broader world picture. This course is one of four Foundations courses that you will take in the area of Natural Sciences and Quantitative Reasoning.

Upon completing Natural Science Foundations courses in physical sciences, life sciences, and a lab, you will be able to:
1) explain basic concepts and theories of the natural sciences;
2) use logic and scientific methods to analyze the natural world and solve problems;
3) argue from multiple perspectives about issues in natural science that have personal and global relevance;
4) use technology in laboratory and field situations to connect concepts and theories with real-world phenomena.
Upon completing a Foundations course in Quantitative Reasoning you will be able to:
1) apply appropriate computational skills and use basic mathematical concepts to analyze problems in natural and social sciences; and
2) use methods of quantitative reasoning to solve and communicate answers to real-world problems.

Class
Every class meeting we will complete one lab from the Astronomy 109 Lab Manual. The last page of this syllabus includes a tentative schedule. Please make a note of it, as we will deviate from the order in which the labs are printed in the workbook. Keep in mind that this is a tentative schedule, and will change as MLO dates are set. Before meeting each class, you are required to read the lab introduction and background sections so you are better prepared to complete the lab in a timely manner. The lab class will begin with an introduction to the current lab, where any necessary information and mathematics will be reviewed. The remaining time will be available for you to complete the lab exercise.

Lab details and format
You are encouraged to complete your lab in groups, but keep in mind that you must write your own lab report using your own words. Follow the step-by-step instructions in the lab manual and write out your work, including all calculations and your answers to the questions. You should write your lab directly in the lab manual and rip out the pages to turn them in when you are done. If there is not enough space for your answer in the lab manual, use separate sheets of paper and hand them in with the manual. Groups should be limited to three people. If you work in a group, write the names of all of the group members on the top of your lab report and put a box around your name. Make sure your handwriting is legible, all your calculations are included, and there is a box around your answer, otherwise you will not receive full credit. Some questions require multiple answers and/or require a drawing, so be sure to read each question carefully and answer it completely.
A one-paragraph conclusion/summary at the end of your lab write-up is required. This will help me to determine the knowledge you gained from this lab. It is your opportunity to briefly address the following questions:

- What answers did I find in completing this lab? How did I find them?
- In what way did this lab contribute to my understanding of astronomy?
- What will I take away from this lab?
- What did I like/dislike about the lab?

Once you have completed your lab write-up, turn it in to me, and you are free to go! You should easily be able to complete the lab during the allotted class time. Late labs are NOT accepted.

Lab grading
Each lab will be worth 50 points. 40 points will be composed of the lab questions, and 10 points for your summary/conclusion. In addition to grading for correct answers I will also look for the following when determining your score:
- **All** the steps to your calculations! Be sure to box your final answers.
- Include units when writing your final answer (e.g. if the question asks “What is the distance to the Sun?”, don’t just write “93 million” but include the unit of “miles”).
- General neatness and organization.

There are NO make-up labs. In lieu of this, I will be dropping your two lowest lab scores.

In total, the class is out of 700 points. Your final grade in the course will be determined by the following scale:

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<th>Grade</th>
<th>Percentage Range</th>
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<tr>
<td>A</td>
<td>95%-100%</td>
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<tr>
<td>A-</td>
<td>90%-94.9%</td>
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<td>B+</td>
<td>87%-89.9%</td>
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<td>B</td>
<td>83%-86.9%</td>
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<tr>
<td>B-</td>
<td>80%-82.9%</td>
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<td>C+</td>
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**Extra Credit**

There is no extra credit in this course.

**Class Projects**

Astronomy Picture of the Day (APOD): NASA hosts a website that posts a different astronomical picture every day. The image topics range from planets, stars, and eclipses, to star clusters, large galaxies and planetary nebulae. For this project, you will choose one of these images, research the image, write a paper about what you learned from your research (1000 words), and give a 5-minute presentation to the class, displaying the image and what you learned about it. This project is worth 100 points: 70 points for the paper and 30 points for the presentation. For more information on this project see Lab 10 in the Lab Manual (page 79). To select a picture, visit the APOD site: http://apod.nasa.gov/apod/archivepix.html

Field Trip to Mount Laguna Observatory: As part of Astronomy 109, students are required to attend a field trip to San Diego State University’s Mount Laguna Observatory (MLO), a professional astronomical observatory at which SDSU’s faculty and students conduct astronomical research. MLO is located in the Cleveland National Forest, about 1 hour East of SDSU’s campus. Attending the field trip is a requirement for the course, and students are responsible for their own transportation. Participants are required to be registered SDSU students or appointed faculty or staff. Prior to attending the field trip, all attendees must fill out and sign the “Warning, Waiver, and Release of Liability” form contained in the back jacket of the Lab Manual, and turn it in to the lab instructor. Additional information about the trip is contained in the Lab Manual, on the form...
“Mount Laguna Observatory Field Trip Potential Risks and Dangers” that is tucked into the back jacket of the manual.

• Purpose of trip: While at MLO, students will have the unique opportunity to see deep space objects through a large telescope, and observe the night sky from a very dark location.
• Instructional outline of trip: Students assemble in the parking lot of MLO at the time and date indicated by the lab instructor. A Teaching Associate will walk students up to the Visitor’s Telescope, where they will be able to view deep-sky objects. There will be at least two Teaching Associates available to assist students. While waiting to look through the telescope, additional activities may be provided to students by the Teaching Associates (e.g., finding constellations, identifying the Milky Way, observing planets, spotting satellites, etc.). At the conclusion of the telescope viewing, all students will be escorted down to the parking lot by a Teaching Associate, where they are to leave the Observatory. No students may remain at MLO after the Teaching Associates have departed.

• Health and safety instructions: MLO is considered an extension of the main SDSU campus; hence, the SDSU Student Code of Conduct applies at MLO, and MLO is a drug and alcohol-free workplace. Students are to bring a small flashlight, and are to remain on designated paths and roads at all times. Personal injury from falls, or scrapes and cuts from tree limbs and brush, can easily result from taking cross-country shortcuts. It can get quite chilly up at the Observatory in the evenings, and so all students are advised to dress very warmly — e.g., heavy jacket, long pants, socks and shoes (open-toed shoes are strongly discouraged); gloves and a hat are also recommended. Smoking and campfires are prohibited. Additional safety instructions are found in the “Mount Laguna Observatory Field Trip Potential Risks and Dangers” form that is tucked into the back jacket of the lab manual.


Student Learning Objectives
Upon completing this course, students should be able to:

1. Explain the process by which humans first correctly deduced the size and shape of the Earth.
2. Research an astronomical topic of your choice and display understanding of your topic in both an oral presentation and a written paper.
3. Describe the phases of the moon, and explain why the moon cannot always be seen at night.
4. Apply scientific problem solving abilities to other academic areas.
5. Determine their rough latitude on Earth's surface at any time through careful observation of the nighttime sky.
6. Convince a fellow student who has never taken an astronomy class that it is possible to determine the precise distance to a nearby star through the careful analysis of its location in the sky over the course of a year.
8. Present the currently favored scientific theory for what the ultimate fate of our universe will be, and outline the astronomical observations upon which the theory is based.
9. Read and comprehend articles concerning astronomy that appear in the popular press, and participate in discussions about them.
10. Describe at least three major areas in which our astronomical knowledge is known to be incomplete.

Attendance and Tardiness
Attendance is absolutely mandatory for all lab meetings. If you are absent for more than 3 classes, you will receive an automatic fail for the course. You can make-up a lab if and only if you let me know that you will be absent before the lab you are going to miss. You can only be excused from a lab for extenuating circumstances (beyond your control). No make-ups will be allowed for the course projects. If you are more than 15 minutes late, you will be considered absent, even if you come into class after that point.

Students with Disabilities
If you are a student with a disability and believe you will need accommodations for this class, it is your responsibility to contact Student Disability Services at (619) 594-6473. To avoid any delay in the receipt of your accommodations, you should contact Student Disability Services as soon as possible. Please note that accommodations are not retroactive, and that accommodations based upon disability cannot be provided until you have presented your instructor with an accommodation letter from Student Disability Services. Your cooperation is appreciated.

Cheating and Plagiarism Policy
Consistent with University policy, cheating and plagiarism are not tolerated in Astronomy 109. As defined by SDSU’s General Catalog, “Plagiarism is formal work publicly misrepresented as original”. Plagiarism and cheating are theft. Remember: While you are encouraged to work together on laboratory assignments, the words that you write in your lab reports must be your own. If you copy more than 4 words in a row from any source (including any source on the World Wide Web, or your lab partner!) and do not properly reference that source (i.e., put the words in quotes, with proper citation), you are committing plagiarism. If plagiarism or cheating is deemed to have occurred on a lab report or project, the following steps will be taken:
1. A “0” will be recorded for the assignment grade.
2. An “Academic Dishonesty Incident Report” will be submitted to the Center for Student Rights and Responsibilities. This action is required by Executive Order 1006, which “mandates faculty to report all incidents to the Center for Student Rights and Responsibilities”.
3. The incident will be investigated by the Student Conduct Administrator, who determines whether it is appropriate to charge a student with violation of the Student Conduct Code” (from Executive Order No. 1043, of August 3, 2009). Details on the judicial process (and the potential results, including “severance from the University”) can be found at the Center for Student Right and Responsibilities web page: http://csrr.sdsu.edu/index.html.
**Final Exam**
There is no final exam in this class!

**Questions?**
Any and all are always welcome and encouraged. The best way to learn is to ask questions and challenge what you are being taught. Feel free to talk to me before or after class, via email, stopping by my office, or visiting my help room hours if you have any questions. If you are confused about any aspect of the lab, I encourage you to ask for help.

**Classroom Safety**
Please take note of the university’s classroom safety procedures summarized below that specify courses of action in case of an emergency. For this class, the closest building exit is the west entrance to the building and we will meet at the fountain in the gardens right outside that door. For all information concerning safety in the classroom, please read the information contained at San Diego State University’s “Emergency Preparedness” website: http://bfa.sdsu.edu/emergency/.
San Diego State University
Classroom Emergency Quick Guide

Faculty plays an important role in guiding students in the event of an emergency. The information below is intended to assist faculty with emergency preparedness in a classroom or lab and should be reviewed with students at the beginning of each semester.

**What to Know at the Beginning of a New Semester**

- **Building Evacuation Routes and Evacuation Assembly Points**
  - Building evacuation routes and evacuation assembly points are posted at stairwell and building exits and may also be reviewed and printed at [www.sdsu.edu/prepare](http://www.sdsu.edu/prepare).
  - For this class, the closest building exit is: ___________________________
  - We will meet at: ___________________________

- **Building Doors and Windows**
  - Become aware of how classroom doors and windows operate. Due to the varying age of campus buildings, doors may lock manually, remotely, or not at all.

- **Emergency Communication**
  - Dial 9-1-1 from any phone for emergencies. You will be connected with SDSU Police.

- **Emergency Notification**
  - Information about a campus emergency will be initiated as soon the situation allows and may be communicated using a variety of methods, including text message, outdoor loud speakers, SDSU Home page, recorded emergency information line.
  - Signup to receive emergency notification via text message at [https://phonebook.sdsu.edu/ealert/](https://phonebook.sdsu.edu/ealert/).
  - Outdoor loud speakers may not be audible indoors; refer to the SDSU Home page at [www.sdsu.edu](http://www.sdsu.edu) for information and updates.
  - Program the recorded Emergency Information Line, 1-866-794-8832 into your cell phone.

**What to Do During a Drill or an Actual Emergency**

- **Building Alarm — Evacuate**
- **Fire — Evacuate**
- **Power Outage — Evacuate if instructed to do so**
- **Earthquake — Drop, Cover, and Hold on Under a Desk or Against an Inside Wall (Protect Head and Neck)**
- **Hazardous Material Release (Indoors) — Evacuate**
- **Hazardous Material Release (Outdoors) — Shelter in Place**

**Evacuation Procedures**

- Evacuate using the nearest exit.
- Secure any hazardous materials or equipment before leaving.
- Take personal belongings.
- Assist individuals with disabilities.
- Assemble at your evacuation assembly point unless otherwise instructed.
- Provide emergency personnel with relevant information.
- Remain at evacuation assembly point and do not re-enter building until authorized by emergency personnel.

**Shelter in Place Procedures**

- Stay inside the building or proceed to a safe place.
- If you are in a room with a door, make sure the door is closed.
- If applicable and time permits, lock doors and silence cell phones.
- If you are in a room with a window, make sure the window is closed.
- Remain where you are until further direction from emergency personnel.

**Active Shooter / Violent Intruder — Shelter in Place or Evacuate If Safe to Do So**

**Note:** Shelter in Place and Evacuation Procedures are Different for this Type of Situation. Review Active Shooter Response Protocol at [http://www.dps.sdsu.edu/pdf/Protocol.pdf](http://www.dps.sdsu.edu/pdf/Protocol.pdf) or call Public Safety, 594-1991 to schedule a presentation for your class.

Additional Campus and Personal Emergency Preparedness Information is Available at [www.sdsu.edu/prepare](http://www.sdsu.edu/prepare)

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Lab Schedule
(Subject to change)

August 27  Lab 1: The Size of the Earth
September 3  Lab 15: The Moon
September 10  Lab 2: The Rotation of the Sun
September 17  Lab 4: Kepler’s First Law: The Elliptical Orbits of Planets
September 24  Lab 5: Kepler’s Third Law and Jupiter’s Moons
October 1  Lab 3: The Celestial Sphere
October 8  Lab 6: Measuring Distance with Parallax
          Email APOD photo chosen for final project
October 15  Lab 7: An Exploration of the Properties of Light and Atoms
October 22  Field Trip to Mount Laguna Observatory (weather permitting)
October 29  Lab 12: The Hertzsprung-Russell Diagram
November 5  Lab 14: Distances to Cepheid Variable Stars
            MLO Backup Date
November 12 Lab 8: A Universe of Galaxies & Dark Matter
November 19 Lab 9: The Age of the Universe
            APOD Paper due by 11:59 pm on blackboard
November 26 No Class
December 3  APOD Presentations
December 10 APOD Presentations