

Observational Astronomy

AY 203 Section 001

Fall 2013, Laboratory

Dr. William Keel

Office Hours and Contact Information

Class will be held starting in 313 Gallalee at 7 p.m. Thursday (section 1) or Tuesday (section 2), often moving to the observatory upstairs after an introduction. I may be contacted at wkeel@ua.edu or at 348-1641. Office hours (room 316) are Tuesday 1-3 p.m. and Wednesday 1:15-3:15 (or by appointment).

Prerequisites

UA Course Catalog Prerequisites

Prerequisite(s): MATH 113 or MATH 115 or MATH 125 or MATH 145.

Course Description

UA Course Catalog Information

Students learn to observe and photograph planets, stars, and galaxies using portable telescopes on campus, the 16-inch telescope of the campus observatory, telescopes located in the darker skies at Moundville, and observatory telescopes in Arizona and Chile by internet control. Both indoor exercises and observing projects are undertaken. Students should normally have completed AY101 or a more advanced astronomy course; people concurrently enrolled in AY101 or AY204 can be admitted with the permission of the instructor NOTE: If the student plans to apply AY 203 toward satisfaction of the N requirement of the University Core Curriculum, AY 204 or AY 206 must also be taken.

Core Designations:

Natural Science

This course is designed to give motivated students direct experience in astronomical observations and their analysis, including visual and electronic techniques. We will use portable telescopes on campus, the 16-inch telescope of the campus observatory, telescopes located in the darker skies at Moundville, and observatory telescopes in Arizona and Chile by internet control. The course carries 2 credit hours (one lecture, one lab)

Student Learning Outcomes

After successful completion of the course, students will be able to:

- Understand coordinate systems used in finding and recording celestial objects
- Set up and use common types of portable telescopes
- Locate celestial objects of interest using telescopes with and without automated pointing systems
- Perform and interpret imaging observations with electronic detectors
- Analyze data sets using simple mathematical models, including the role of measurement error
- Carry out and report a complete research project, from concept and data collection to analysis and conclusions

Required Texts

UA Supply Store Textbook Information

NONE / NO TEXT REQUIRED (**Required**)

Outline of Topics

Specific **subjects** for each session depend on the weather and phase of the Moon, so if weather dictates, we can select the most appropriate activity shortly before starting. This preliminary schedule of activities is always subject to change depending on weather; the default will be to get students maximum exposure to the real sky.

Tues	Thurs	Lunar phase	Activity
8/27	8/22	Full/gibbous	Intro to sky; setup and visual use of telescopes?
9/3	9/5	New	Planetary satellites and Kepler's laws

9/10	9/12	Crescent	Visual observation of the Moon and planets
9/17	9/19	gibbous/full	Finding objects with manual and automated telescopes
9/24	9/26		Travel, classes may be cancelled
10/1	10/3	morning crescent	CCD images of deep-sky objects
10/8		evening crescent	Remote observation with Chilean facilities
	10/10	crescent	Visual observations of deep-sky objects (Moundville)
10/15		gibbous	Remote observation with Chilean facilities
	10/17	gibbous	High-speed imaging of the moon and planets
10/22		waning gibbous	CCD images of deep-sky objects
	10/24	waning gibbous	Remote observation with Chilean facilities
10/29	11/7	crescent	Astronomical spectroscopy
11/5	11/14	gibbous	Galaxy spectra and the expanding Universe
11/12	11/21	gibbous	Intensity measurements and their uses
11/19	12/5	full/new	Finish individual projects
11/26		waning crescent	Finish individual projects
12/3		new	Finish individual projects; possible predawn comet session

Exams and Assignments

Most weekly labs activities will involve an assignment to be turned in. The lab reports should be self-contained and complete descriptions of each exercise, when forms are not provided in the exercise.

The final exam will test basic concepts used throughout the course. The final exam is scheduled for 7 p.m. on Tuesday, December 10 (for section 2, Tuesday nights) and 7 p.m. on Thursday, December 12 (section 1, Thursday nights).

Each student will do an independent observing project during the semester; get an early start to avoid being clouded out! Some possible independent observing projects include

- Hertzsprung-Russell diagram for a star cluster
- Stellar spectra and classification
- Meteor photography
- Light curves and physical properties of variable stars
- The distribution of galaxies in nearby clusters
- Variability of quasars and active galactic nuclei
- Structures of gaseous nebulae
- Comet tracking (if any are bright enough this term)
- Detection of giant extrasolar planets as they pass in front of their stars
- Evaluate possible astronomical alignments of Moundville structures

Grading Policy

The course grade will be based on results and written reports of the lab sessions (70%), individual observing projects (20%), and a final exam (10%).

Policy on Missed Exams & Coursework

Attendance is important, since many of the activities are hands-on and cannot always be rescheduled. Students who must miss an activity should contact me to negotiate appropriate equivalent activities, where possible. With both Tuesday and Thursday sections, it will sometimes work to attend the other one for students who know they will have to miss.

Severe Weather Guidelines

The guiding principle at The University of Alabama is to promote the personal safety of our students, faculty and staff during severe weather events. It is impossible to develop policies which anticipate every weather-related emergency. These guidelines are intended to provide additional assistance for responding to severe weather on campus.

UA is a residential campus with many students living on or near campus. In general classes will remain in session until the National Weather Service issues safety warnings for the city of Tuscaloosa. Clearly, some students and faculty commute from adjacent counties. These counties may experience weather related problems not encountered in Tuscaloosa. Individuals should follow the advice of the National Weather Service for that area taking the necessary precautions to ensure personal safety. Whenever the National Weather Service and the Emergency Management Agency issue a warning, people in the path of the storm (tornado or severe

thunderstorm) should take immediate life saving actions.

When West Alabama is under a severe weather advisory, conditions can change rapidly. It is imperative to get to where you can receive information from the [National Weather Service](#) and to follow the instructions provided. Personal safety should dictate the actions that faculty, staff and students take.

The Office of University Relations will disseminate the latest information regarding conditions on campus in the following ways:

- Weather advisory posted on the UA homepage
- Weather advisory sent out through UA Alerts to faculty, staff and students
- Weather advisory broadcast over WVUA at 90.7 FM
- Weather advisory broadcast over Alabama Public Radio (WUAL) at 91.5 FM
- Weather advisory broadcast over WVUA-TV/WUOA-TV, and on the website at <http://wvuatv.com/content/weather>. WVUA-TV Home Team Weather provides a free service you can subscribe to which allows you to receive weather warnings for Tuscaloosa via e-mail or cell phone. Check <http://wvuatv.com/content/free-email-weather-alerts> for more details and to sign up for weather alerts.

In the case of a tornado warning (tornado has been sighted or detected by radar; sirens activated), all university activities are automatically suspended, including all classes and laboratories. If you are in a building, please move immediately to the lowest level and toward the center of the building away from windows (interior classrooms, offices, or corridors) and remain there until the tornado warning has expired. Classes in session when the tornado warning is issued can resume immediately after the warning has expired at the discretion of the instructor. Classes that have not yet begun will resume 30 minutes after the tornado warning has expired provided at least half of the class period remains.

Disability Statement

If you are registered with the Office of Disability Services, please make an appointment with me as soon as possible to discuss any course accommodations that may be necessary.

If you have a disability, but have not contacted the Office of Disability Services, please call (205) 348-4285 (Voice) or (205) 348-3081 (TTY) or visit 133-B Martha Parham Hall East to register for services. Students who may need course adaptations because of a disability are welcome to make an appointment to see me during office hours. Students with disabilities must be registered with the Office of Disability Services, 133-B Martha Parham Hall East, before receiving academic adjustments.

Policy on Academic Misconduct

All students in attendance at The University of Alabama are expected to be honorable and to observe standards of conduct appropriate to a community of scholars. The University of Alabama expects from its students a higher standard of conduct than the minimum required to avoid discipline. At the beginning of each semester and on examinations and projects, the professor, department, or division may require that each student sign the following Academic Honor Pledge: "I promise or affirm that I will not at any time be involved with cheating,

plagiarism, fabrication, or misrepresentation while enrolled as a student at The University of Alabama. I have read the Academic Honor Code, which explains disciplinary procedure resulting from the aforementioned. I understand that violation of this code will result in penalties as severe as indefinite suspension from the University.”

See the [Code of Student Conduct](#) for more information.