



Astronomy 302 Section 001

Observational Astronomy

Mon/Wed 2:00 –2:50 PM, Steward 204

Fri 2:00 – 2:50 PM, Steward 208

Description of Course

Astronomy 302 is a course intended for those who desire to pursue a career in astronomy or related technology fields. The course will cover the theoretical and technical aspects that underpin astronomical observations, and include hands-on experience at professional astronomical telescopes. Students will design and carryout a research project in small groups using the CCD camera on the 61” Kuiper telescope on Mt. Bigelow, and will have the option to conduct spectroscopic observations at the 90” Bok telescope on Kitt Peak. Data will be reduced by standard astronomical software packages and by custom software written by students. Results from the project will be written up as a formal research project, and presented in class. This class will require a substantial time investment from the student and may be quite challenging.

Course Prerequisites or Co-requisites

The course assumes a minimum preparation of:

- CSC 110 or ECE 175 or PHYS 105A or PHYS 305
- PHYS 142 or PHYS 162H
- MATH 122B or MATH 125
- ASTR 250

Potential students who are unsure of their level of preparation should consult the instructors.

Instructor and Contact Information

Dr. Chad Bender, cbender@email.arizona.edu

Dr. Elizabeth Green, egreen@email.arizona.edu

Mr. Harrison Krantz, harryk@email.arizona.edu

Office Hours: Bender: (in-person) Mon 3-4pm, Wed 11am-noon, zoom by appt.; Green: by appt.

Course Website (D2L): <https://d2l.arizona.edu/d2l/home/1059253>

Course Format and Teaching Methods

The course will be comprised of lectures, labs, graded homework, a semester project, and exams. Monday and Wednesday meetings will be lecture based. Friday meetings will be lab sessions. There will be approximately six homework assignments throughout the semester, due every other week. There will be observing sessions, scheduled on Friday, Saturday, (and optional Sunday) nights throughout the semester. Dr. Bender will lead the classroom lectures, labs, homework, and exams. Dr. Green will lead the observing.

Course Objectives and Expected Learning Outcomes

Students will gain a practical understanding of observational astronomical techniques at Radio to UV wavelengths.

Students will be able to plan and execute astronomical observations.

Students will develop skills related to interpretation and communication of results based on astronomical data.

Course Modality

This class is scheduled to be taught in the flex in-person modality.

Class Meetings

In-person meeting times and locations: M/W: Steward 204, F: Steward 208

At current enrollment levels and room capacity levels, only a single cohort will be used for lectures/labs. If enrollment increases substantially in the first 2 weeks of the semester, this will be revisited and any changes announced in class.

On-line meeting times: Remote observing at Mt. Bigelow 61" and Bok 90" telescopes

Small groups will be scheduled for observing in Sept, Oct, & Nov either in person or remote as restrictions at observatory sites allow.

Required Texts or Readings:

Observational Astronomy, Birney, Gonzalez, and Oesper, 2nd Edition (NOTE: The 1st edition is substantially out of date and is not suitable for this class)

A practical guide to data analysis for physical science students, Lyons (available digitally via the UA Library)

Some of the material covered in this course is not contained in the textbooks. Your lecture notes will serve as your primary reference for those lectures.

Additional Useful Texts:

Data Reduction and Error Analysis for the Physical Sciences, Bevington

Practical Statistics for Astronomers, Wall & Jenkins

Handbook of CCD Astronomy, Howell

Tools of Radio Astronomy, Wilson, Rohlfs, Huttemeister, Sixth Edition

Assignments and Examinations:

Midterm Exam: October 11

Semester Project Reports: November 24

Final Exam: December 10

<https://www.registrar.arizona.edu/courses/final-examination-regulations-and-information>

<http://www.registrar.arizona.edu/schedules/finals.htm>

Grading Scale and Policies

The course is given for standard (ABCDE) grades. A: >90%; B: >80%; C: >70%; D: >60%

Grading will be based on a mid-term exam (20%); a final exam (30%) divided roughly 2/3 on the material since the mid-term and 1/3 comprehensive for the course; a semester project (30%), and homework and class participation (20%).

Late homework will deduct 20% per day.

Homework should be turned in via D2L. Scans or photographs of neat hand written answers are acceptable. Typed answers are also accepted, but not required. Any required special accommodations must be reached prior to the deadline.

University policy regarding grades and grading systems is available at:

<http://catalog.arizona.edu/policy/grades-and-grading-system>

Requests for incomplete (I) or withdrawal (W) must be made in accordance with University policies, which are available at <http://catalog.arizona.edu/policy/grades-and-grading-system#incomplete> and <http://catalog.arizona.edu/policy/grades-and-grading-system#Withdrawal> respectively.

Schedule Topics/Activities

See the course schedule spreadsheet posted on D2L for a list of lecture & lab topics, homework & exam dates. All dates (except for exam dates) are subject to revision.

Absence and Class Participation Policy

If you feel sick, or may have been in contact with someone who is infectious, stay home. Except for seeking medical care, avoid contact with others and do not travel.

Notify your instructor(s) if you will be missing a course meeting or an assignment deadline.

Non-attendance for any reason does **not** guarantee an automatic extension of due date or rescheduling of examinations/assessments.

Please communicate and coordinate any request directly with your instructor.

If you must miss the equivalent of more than one week of class, you should contact the Dean of Students Office DOS-deanofstudents@email.arizona.edu to share documentation about the challenges you are facing.

Voluntary, free, and convenient [COVID-19 testing](#) is available for students on Main Campus.

If you test positive for COVID-19 and you are participating in on-campus activities, you must report your results to Campus Health. To learn more about the process for reporting a positive test, visit the [Case Notification Protocol](#).

COVID-19 vaccine is available for all students at [Campus Health](#).

Visit the [UArizona COVID-19](#) page for regular updates.

Classroom Behavior Policy

Students are asked to refrain from disruptive conversations with people sitting around them during lecture, or other activities that are disruptive to the class environment. Students observed engaging in disruptive activity will be asked to cease this behavior. Those who continue to disrupt the class will be asked to leave lecture or discussion and may be reported to the Dean of Students.

University-wide Policies

Academic advising: If you have questions about your academic progress this semester, please reach out to your academic advisor (<https://advising.arizona.edu/advisors/major>). Contact the Advising Resource Center (<https://advising.arizona.edu/>) for all general advising questions and referral assistance. Call 520-626-8667 or email to advising@.arizona.edu

Life challenges: If you are experiencing unexpected barriers to your success in your courses, please note the Dean of Students Office is a central support resource for all students and may be helpful. The [Dean of Students Office](#) can be reached at (520) 621-2057 or DOS-deanofstudents@email.arizona.edu.

Physical and mental-health challenges: If you are facing physical or mental health challenges this semester, please note that Campus Health provides quality medical and mental health care. For medical appointments, call (520) 621-9202. For After Hours care, call (520) 570-7898. For the Counseling & Psych Services (CAPS) 24/7 hotline, call (520) 621-3334.

Threatening Behavior Policy: The UA Threatening Behavior by Students Policy prohibits threats of physical harm to any member of the University community, including to oneself. See <http://policy.arizona.edu/education-and-student-affairs/threatening-behavior-students>.

Students with Disabilities: Accessibility and Accommodations: At the University of Arizona, we strive to make learning experiences as accessible as possible. If you anticipate or experience barriers based on disability or pregnancy, please contact the Disability Resource Center (520-621-3268, <https://drc.arizona.edu>) to establish reasonable accommodations.

Code of Academic Integrity: Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. However, graded work/exercises must be the product of independent effort unless otherwise instructed. Students are expected to adhere to the UA Code of Academic Integrity as described in the UA General Catalog. See: <http://deanofstudents.arizona.edu/academic-integrity/students/academic-integrity>. The University Libraries have some excellent tips for avoiding plagiarism, available at <http://www.library.arizona.edu/help/tutorials/plagiarism/index.html>.

UA Nondiscrimination and Anti-harassment Policy: The University is committed to creating and maintaining an environment free of discrimination; see <http://policy.arizona.edu/human-resources/nondiscrimination-and-anti-harassment-policy>

Confidentiality of Student Records: <http://www.registrar.arizona.edu/personal-information/family-educational-rights-and-privacy-act-1974-ferpa?topic=ferpa>

Subject to Change Statement: Information contained in the course syllabus, other than the grade and absence policy, may be subject to change with advance notice, as deemed appropriate by the instructor.