



## **Astronomy 302**

### **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 imaging 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 4096x4096 pixel CCD camera on the 61" Kuiper telescope on Mt. Bigelow. 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**

Prof. Peter A. Milne, [pmilne@arizona.edu](mailto:pmilne@arizona.edu)

Dr. Elizabeth Green, [egreen@email.arizona.edu](mailto:egreen@email.arizona.edu)

Mr. Fengwu Sun, [fengwusun@arizona.edu](mailto:fengwusun@arizona.edu)

Office Hours: **Milne:** Wed noon-1:00pm and by appt. In-person in Steward Rm 506  
and via Zoom

**Green:** by appt.

Course Website (D2L): <https://d2l.arizona.edu/d2l/home/1190551>

#### **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 required observing sessions at Mt. Bigelow and Kitt Peak, scheduled on Friday and Saturday nights throughout the semester. Prof. Milne will lead the classroom lectures, homework, and exams. Dr. Green will lead the observing.

#### **Assignments and Examinations:**

Midterm Exam: October 10

Semester Project Reports: November 28

Final Exam: May 09 - 1pm - 3pm

## Course Learning Outcomes

Upon completion of this course, students will be able to:

- Employ discipline skills related to the observational techniques, instrumentation, computational methods, and software applications used to investigate modern astrophysical phenomena and problems.
- Demonstrate the ability to meaningfully analyze, apply and integrate the principle findings, common applications, fundamental techniques, and underlying theory of the astronomy discipline.
- Conduct guided research in a specific area of the discipline of astronomy.
- Develop proficiency with communicating and interpreting fundamental astronomical concepts and research results in oral and/or written formats.

## Fall 2022 Covid-19 Policies

As we enter the Fall semester, the health and wellbeing of everyone in this class is the highest priority. Accordingly, we are all required to follow the university guidelines on COVID-19 mitigation. Please visit [www.covid19.arizona.edu](http://www.covid19.arizona.edu) for the latest guidance.

### Course Meeting Structure

This class will be taught in the Flex In-Person modality. The regularly scheduled lectures on MW and the labs on F will both be usually taught in-person. Students who cannot attend in-person will be accommodated. If you are unable to attend please contact the instructors so that we can ensure your needs are being met.

The observing portions of this class will be conducted remotely via Zoom.

### Technology usage

Students participating on Zoom will not be required to use cameras. Please respect the privacy and intellectual property of your fellow students and the instructors, and do not post or link outside of D2L to course material, including recorded lectures.

### In person classroom policies

The University of Arizona recommends that surgical or higher-grade face coverings (i.e., not cloth) be worn at all times when in shared spaces such as classrooms, hallways, restrooms, etc. The university policy can be found here: <https://covid19.arizona.edu/face-coverings>.

Physical distancing is required in our classroom: During our in-person class meetings, we will respect CDC guidelines, including restricted seating to increase physical distancing and appropriately-worn face coverings

### Attendance policies:

- If you feel sick, or if you need to isolate or quarantine based on University protocols, stay home. Except for seeking medical care, avoid contact with others and do not travel.
- Notify your instructors if you will be missing a course meeting or assignment deadline
- Non-attendance for any reason does not guarantee an automatic extension of due date or rescheduling of examinations. Please communicate and coordinate any request directly with your instructor.
- If you must miss the equivalent of more than one week of class, please contact the Dean of Students Office 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.
- [Campus Health](#) is testing for COVID-19. Please call (520) 621-9202 before you visit in person.
- Visit the [UArizona COVID-19](#) page for regular updates.

## Required Texts or Readings:

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

An Introduction to Error Analysis, Taylor 2nd Edition

Some of the material covered in this course is not contained in the textbook. 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

## Final Examination

May 09, 2022 at 1:00pm-3:00pm

<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 (20%) divided roughly 2/3 on the material since the mid-term and 1/3 comprehensive for the course; a semester project (20%), homework (30%) and class participation (10%).

Late homework will deduct 10% per day, including the day it is due. 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.

## Absence and Class Participation Policy

The UA's policy concerning Class Attendance, Participation, and Administrative Drops is available at: <http://catalog.arizona.edu/policy/class-attendance-participation-and-administrative-drop>

The UA policy regarding absences for any sincerely held religious belief, observance or practice will be accommodated where reasonable, <http://policy.arizona.edu/human-resources/religious-accommodation-policy>.

Absences pre-approved by the UA Dean of Students (or Dean Designee) will be honored. See: <https://deanofstudents.arizona.edu/absences>

Participating in the course and attending lectures and other course events are vital to the learning process. Students who will miss a lecture due to a pre-known academic activity should discuss the absence with the instructors as soon as the absence is known, and as far in advance as possible.

## 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.

## 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>.

**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](mailto: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](mailto: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.

**Students with Disabilities:**

If you anticipate barriers related to the format or requirements of this course, please meet with me so that we can discuss ways to ensure your full participation in the course. If you determine that disability-related accommodations are necessary, please register with Disability Resources (621-3268; <https://drc.arizona.edu/>) and notify me of your eligibility for reasonable accommodations. We can then plan how best to coordinate your accommodations. If you require special accommodation in testing, you must notify Prof. Beatty at the beginning of the semester.

**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.