

# ASTR 300B Radiation & Matter 2020 Syllabus

Steward Observatory 208 MWF 2-3pm



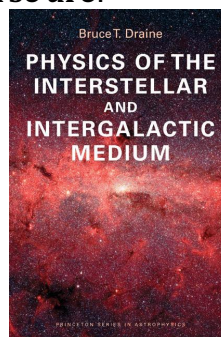
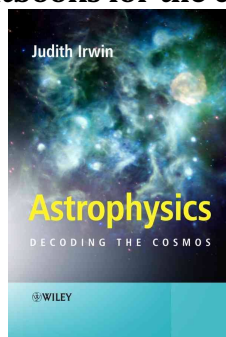
**Instructor: Dr. Yancy Shirley**      **Phone: 626-3666**  
**[yshirley@email.arizona.edu](mailto:yshirley@email.arizona.edu)** (include "ASTR300B" in title)  
**N310 Steward Observatory**  
**Office Hours:**  
<http://eldora.as.arizona.edu/~yshirley/Arizona/AST300B/>

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**Course Description:** ASTR 300B is a class studying the physical processes that emit, absorb, and scatter light in the context of the physics of the interstellar medium. In this class you will learn radiative transfer in one dimension, learn the fundamental physics of thermal and non-thermal emission processes in the interstellar medium, and learn the basics of atomic and molecular spectroscopy. Topics we shall cover in this class include: continuum emission processes due to dust emission and absorption, free-free emission, and synchrotron emission; atomic ionization and recombination and electronic bound-bound transitions; statistical mechanics (Boltzmann Equation) and equilibrium; and molecular rotational and vibrational transitions.

**Co-requisites:** Completed ASTR250 & ASTR 300A and have completed or are currently taking PHYS 331 (E&M I) and PHYS 371 (Quantum Mechanics I).

**The two reference textbooks for the course are:**



### **Course Learning Outcomes:**

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

1. Demonstrate the ability to meaningfully analyze, apply and integrate the principle findings, common applications, current problems, fundamental techniques, and underlying theory of the astronomy discipline.
2. Employ discipline skills related to the observational techniques, instrumentation, computational methods, and software applications used to investigate modern astrophysical phenomena and problems.
3. Participate in the scholarly, ethical, and discipline specific practices of the field at an emergent level.

### **Grading:** Homework (75%) Final Exam (25%)

The final grade maximum scale is set at: A(>85%), B(>70%), C(>60%), D(>50%).

Your grade in this course will depend on your performance on the homework (75% of total including both in-class and take-home questions) and the final exam (25% of total). Homework assignments are due at the beginning of class. Homework due dates will be posted on the course webpage. If you incorrectly solve a homework problem, you may correct the problem and turn it back in for half additional credit with the next homework assignment. Be reasonable please – don't turn-in a bunch of homework to re-grade near the end of the semester (I won't accept them). The final homework score for the class is the sum of all homework problem grades. You may drop your lowest homework problem scores in the calculation of the final grade.

Emergencies and life circumstances happen! Please contact me *in advance* if you know you will miss a class or cannot turn in a homework and we can work out a solution.

Students are encouraged to share intellectual views and discuss freely the principles and applications of course materials. Modern science is collaborative, and people learn from talking to each other. 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: [https://deanofstudents.arizona.edu/sites/deanofstudents.arizona.edu/files/code\\_of\\_academic\\_integrity.pdf](https://deanofstudents.arizona.edu/sites/deanofstudents.arizona.edu/files/code_of_academic_integrity.pdf)

What this means specifically for our class is: Do your own work for take home assignments and the final exam. Feel free to talk to the instructor or other students about homework assignments. We will have in-class collaborative assignments where you work together. Don't just copy someone else's solutions. Always write up your own solutions. *Using or copying homework solutions from last year's class is also cheating.* Copying is cheating and will be handled according to the university policies. The repercussions for those found guilty of violating the Code will include loss of credit for the work and may include failure of the course.

**Final Exam:** is open-note meaning you will be allowed to use your notes, old homeworks, and books/readings for the class. **May 8 from 1-3pm in SO 208**

Grades for homework may be disputed up to one week after they have been graded and handed back. Final course grades will be submitted by Friday May 8<sup>th</sup>.

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.

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>

### **Classroom Behavior Policy**

To foster an equitable learning environment, students and instructors have a shared responsibility. We want a safe, welcoming, and inclusive environment where all of us feel respected and comfortable with each other and where we voice our ideas and challenge ourselves. To that end, our focus is on the tasks at hand and not on extraneous activities (i.e. texting, chatting, reading a newspaper, making phone calls, web surfing, etc). We ask that you come to class ready to fully engage and work collaboratively everyday! We also ask that you respect your fellow classmates and their learning.

### **Threatening Behavior Policy**

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

### **Accessibility and Accommodations**

Our goal in this classroom is that learning experiences be as accessible, equitable and as inclusive as possible. If you anticipate or experience physical or academic barriers based on disability, please let me know so that we can discuss options. You are also welcome to contact Disability Resources (520-621-3268) to establish reasonable accommodations. For additional information on Disability Resources and reasonable accommodations, please visit: <http://drc.arizona.edu/>

If you have reasonable accommodations, please plan to meet with me by appointment or during office hours to discuss accommodations and how my course requirements and activities may impact your ability to fully participate.

### **UA Nondiscrimination and Anti-harassment Policy**

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

Our classroom is a place where everyone is encouraged to express well-formed opinions and their reasons for those opinions. We also want to create a tolerant and open environment where such opinions can be expressed without resorting to bullying or discrimination of others.

### **Additional Resources for Students**

UA Academic policies and procedures are available at:

<http://archive.catalog.arizona.edu/2015-16/policies/aaindex.html>

Student Assistance and Advocacy information is available at:

<http://deanofstudents.arizona.edu/student-assistance/students/student-assistance>

The University of Arizona provides a wide variety of resources to help you feel more at home in the UA environment. Examples of student resource/cultural centers include:

- The African-American Student Center
- The Asian & Pacific American Student Center
- The Guerrero Student Center
- The Immigrant Student Resource Center
- The LGBTQ+ Student Center
- The Native American Student Center
- The Transfer Student Center
- The Veterans Education and Transition Services Center
- The Women & Gender Resource Center

We encourage you to take advantage of the community, support, and learning opportunities afforded by these centers, and to encourage your friends and colleagues to do the same.

### **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.