

ASTR 515 — ISM and Star Formation

Fall 2022

Instructor:

Prof. Daniel Stark
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Office Hours: by appointment

Course Description:

This course will cover basics of atomic and molecular spectroscopy, phases of the ISM, photoionization, line diagnostics, dust physics, basics of star formation, the initial mass function, supernovae, shocks, the CGM, and the IGM.

Textbook:

This course will primarily follow the material covered in the *Interstellar and Intergalactic Medium* by Barbara Ryden and Richard Pogge. Bruce Draine's textbook *Physics of the Interstellar and Intergalactic Medium* is recommended and will be a useful reference. For a detailed treatment on the physics of ionized gas, please see the *Astrophysics of Gaseous Nebulae and Active Galactic Nuclei* by Donald Osterbock and Gary Ferland. Additional resources on fluids, spectroscopy, and star formation will be provided throughout the semester.

Grading Policy:

The final grade will be determined by:

Homework: 30%

Two exams: 40 %

In-class work: 30%

Grading Scale

A	90%-100%
B	80%-89%
C	70%-79%
D	60%-69%
E	≤50%

Incompletes will only be given if a student has satisfactorily completed the majority of the work in the class and has a valid reason, such as medical, for not completing the remainder of the course. Students must make arrangements with the instructor in order to receive an incomplete.

Assignments and Exams:

There will be homework assigned throughout the semester accounting for 30% of the final grade. The homework will be due at the beginning of class on the days indicated on the schedule. If you have circumstances that cause you to need extra time, please let me know ahead of the due date.

The grade of late homework that is not excused ahead of time will be penalized.

There will also be two in-class exams (October 11 and December 13), which will account for 40% of the final grade. Exams will be closed book, but relevant equations and constants will be provided. You will be given a review sheet for each exam.

In-class Activities:

We will often do short problems/exercises in small groups. We will also review recent papers on relevant topics throughout the semester with the goal of introducing you to modern applications of ISM and star formation. Each of you will be asked to give a short (5-10 minute) informal overview of the paper, as you would present at an arXiv discussion. Content of the papers will be covered on the exams, so everyone is expected to be familiar with the main points of all papers covered. In-class activities will account for 30% of the grade. Attendance is crucial for this component of the grade. If you need to miss a class (i.e., due to illness or observing), please let the professor know ahead of time to receive full credit for in-class work.

Learning outcomes

1. Exhibit an expert-level facility to engage with the principle findings, common applications, current problems, fundamental techniques, and underlying theory of the astronomy discipline.
2. Demonstrate advanced discipline skills and knowledge necessary to utilize the observational techniques, instrumentation, computational methods, and software applications used to investigate modern astrophysical phenomena and problems.
3. Develop expertise with communicating, translating and interpreting fundamental astronomical concepts and research results in oral and/or written formats.

Additional Information:

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 for the latest guidance.

Students with disabilities who require accommodations to fully participate in course activities or meet course requirements are encouraged to register with the Disability Resource Center and contact us to discuss access issues.

Students are expected to follow all of the university-wide student policies, which are available at <http://catalog.arizona.edu>

Students are also expected to understand and follow the Student Code of Academic Integrity: <http://deanofstudents.arizona.edu/codeofacademicintegrity>

Other than grade and absence policies, the information contained in this syllabus may be subject to change with reasonable advance notice.