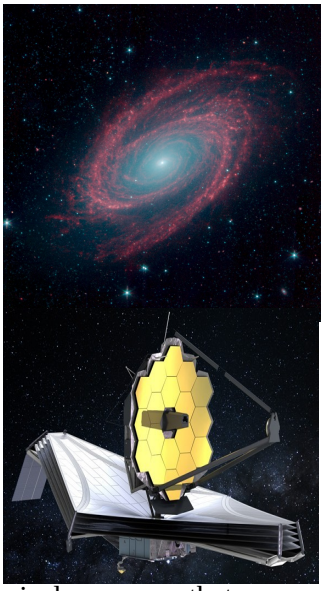
UNIVERSITY OF WYOMING
ASTR5470: Interstellar Medium
Fall 2024, 4 credits
Class meetings will be held in PS 227
Tuesdays & Thursdays 1:20-2:35 pm



Instructor contact information:

Instructor: Daniel Dale
Office: Room 214 Physical Sciences
email: ddale@uwyo.edu
website: http://physics.uwyo.edu/~ddale/teach

Office hours and/or open door policy:

M 1:00-2:50, W 12:00-12:50, or by appointment.

Course prerequisites, co-requisites, enrollment restrictions:

Graduate student standing, or permission by instructor.

Course Description:

I am excited to teach you! In this course you will learn the basic structure and physical processes that dominate the interstellar medium. We will cover topics ranging from the incredibly small (electronic transitions within atoms) to the extremely large (the magnetic field of the entire Galaxy), from the highly energetic (supernovae) to the quiescent (cold dust and gas clouds at ~10 K), and environments ranging from stellar atmospheres to galaxy halos.

Student Learning Outcomes:

Students will be able to identify the different phases of the interstellar medium. Given plausible scenarios including initial physical conditions, students will be able to carry out quantitative calculations that characterize the bulk properties and evolution over time for various astrophysical phenomena relevant to the interstellar medium.

Required texts, readings, and special tools or materials:

We will use *The Physics and Chemistry of the Interstellar Medium* by Tielens as a general guide to the topics covered during the semester. Since graduate coursework sometimes requires delving into material that goes beyond what is presented in the course, here are some excellent additional resources:

Draine (2011)	*Physics of the Interstellar Medium*
Kwok (2006)	*Physics and Chemistry of the Interstellar Medium*
Lequeux & Falgarone (2004)	*The Interstellar Medium*
Maciel (2013)	*Astrophysics of the Interstellar Medium*

General requirements and expectations for the course:

Homework will be accepted up to 24 hours late, but with a 50% penalty. Students are expected to attend every class meeting. Please contact me in advance if you plan to miss class.

Required examinations, assignments, activities, and projects.

Students will be expected to complete ~bi-weekly homework assignments, respond to all questions posed by email, and present reviews of multiple journal articles.

Since ideas and definitions from the text will be used freely in class, it is necessary for you to read the assigned chapters before class. To promote interesting and relevant in-class discussions, we will utilize "Just-in-Time Teaching," whereby students respond to a question posted via email. The responses will be due before lecture, but far enough in advance such that depending on the responses, the classroom activities can be better tailored to meet student needs.

Research on science teaching has shown that the standard "sage-on-the-stage", one-way communication format is not the most effective learning environment. Thus, we will use a mixture of seminar-type discussions, problem-solving sessions, think-pair-share questions, and in-class presentations.

We will frequently review topics focused on the interstellar medium. There are only two rules: i) The presenter has seven minutes to review the salient aspects of a journal article; ii) one slide may be used to aid the presentation (plus one for the article title & authors). You may squeeze as much material as you want into the transparency/slide, but beware the impact on your audience. Please choose to review a *refereed* article relevant to that week's topic.

This will be excellent preparation for presentations made at national meetings of the *American Astronomical Society*. *AAS* speakers are limited to a whopping five minutes, and those who try to cram their 45-minute, 45-slide presentation into 300 seconds are not viewed favorably by their peers. In addition, posters at smaller conferences are frequently advertised with one slide in one minute.

Final Examination / Project Date:

Set by the Office of the Registrar.

Grading Scale and Grading Policies:

Grades will be determined according to the following tentative distribution: class participation and Just-in-Time questions at 5%, presentations at 10%, homework assignments at 65%, and the final exam/project at 20%. Homework will be accepted up to 24 hours late, but with a 50% penalty. Grades of A/B/C/D will be assigned for scores of 90/80/70/60 percentiles, but the grades may ultimately be adjusted ("curved") above these thresholds.

Use of Artificial Intelligence and other Resources for Course Work

Students should acknowledge all sources of assistance when completing homework assignments, including classmates and artificial intelligence. For example, text generated using ChatGPT-3 should include a citation such as: "ChatGPT-3 was used on DD Month YYYY with the following query." Material generated using other tools should follow a similar citation convention.

Attendance and Absence policies.

Students are expected to attend every class meeting. Please contact me in advance if you plan to miss class. The University policies on excused absences: UW Regulation 2-108.

Reading assignments for the weeks beginning on:

Aug 26 Chapter 1	Aug *26 Dog Day*	*Aug 27 Just Because Day*
Sep 02	*Sep 02 Labor Day*	*Sep 02 Beheading Day*

Sep 09	Chapters 2 & 3 & 4	*Sep 08 Date Nut Bread Day*	*Sep 09 Teddy Bear Day*
Sep 16		*Sep 15 Felt Hat Day*	*Sep 16 Collect Rocks Day*
Sep 23	Chapters 5 & 6	*Sep 22 Hobbit Day*	*Sep 25 Comic Book Day*
Sep 30		*Oct 01 Coffee Day*	*Oct 03 Virus Appreciation Day*
Oct 07	Chapter 7	*Oct 08 Pierogi Day*	*Oct 10 Handbag Day*
Oct 14		*Oct 12 Gumbo Day*	*Oct 16 Dictionary Day*
Oct 21	Chapter 8	*Oct 21 Count Your Buttons Day*	*Oct 23 Mole Day*
Oct 28		*Oct 28 Plush Animal Lover's Day*	*Oct 29 Internet Day*
Nov 04	Chapters 9 & 10	*Nov 03 Cliche Day*	*Nov 06 Saxophone Day*
Nov 11		*Nov 11 Origami Day*	*Nov 12 Happy Hour Day*
Nov 18	Chapters 11 & 12	*Nov 16 Fast Food Day*	*Nov 21 Use Less Stuff Day*
Nov 25	[*Break*]	*Nov 23 Eat a Cranberry Day*	*Nov 24 Evolution Day*
Dec 02		*Dec 04 Wear Brown Shoes Day*	*Dec 05 Day of the Ninja*
Dec 09	Finals Week	*Dec 10 Dewey Decimal Day*	*Dec 12 Gingerbread House Day*