ASTR 365.01: Stellar Astronomy and Astrophysics II

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Astronomy 365: Stellar Astronomy and Astrophysics II
University of Montana
Spring 2024
MWF 10:00-10:50 am
CHCB 230
Course Number 34252

Professor: Dr. Deborah Good
Email: deborah.good@umontana.edu
Office Hours: TBD.

Course Description:
This course is the second in a two course sequence studying the star, the fundamental unit of astronomy. In this course, we will apply the physical laws to understand birth, evolution, death, and aftermath of stars. In ASTR 363, we covered the internal structure of individual main-sequence stars (including the Sun). In ASTR 365, we’ll discuss the time evolution of stars and all the very cool stuff that happens before and after the main-sequence.¹

How are stars born, how do they live, how do they die, and how do they come back?

Course Objectives:
By the end of the course, students will be able to use qualitative and quantitative skills to:

- Describe the processes that govern the interstellar medium.
- Explain the process by which stars are formed.
- Sketch out the main sequence (MS) and post-MS evolution of low and high mass stars.
- Computationally model MS and post-MS evolution.
- Explain the ultimate fates of low and high mass stars.
- Describe various stellar remnants and how they are observed.

Required Textbook:
Available from Amazon & Cambridge University Press for ~$100. Textbook DOI.
This is the same textbook we used for ASTR 363.

Grading:
Homework: 30%
Midterm exams: 3 x 15% = 45%
Cumulative Final: 25%

Homework:
Weekly problem sets will be due to Dr. Good’s office on Mondays, by 5:00 pm MST/MDT. Late homework will not generally be accepted; contact me if you have extenuating circumstances.

¹ AKA the cool stuff.
Exams:
We will have three in-class midterm exams and one cumulative final exam in this course. Midterms are provisionally scheduled for February 16, March 15, and April 19. The final exam will be May 8 at 10:10 am. All exams are closed book. For all exams, you may use one handwritten 8.5” x 11” sheet of notes and equations (front & back; standard US letter size).

Academic Integrity:
Working collaboratively is a core part of astronomy, and I expect you to practice that skill in this course while working on homework and studying. When working in a group, not every idea will originate with you, but it is important that you fully understand your final solution before handing in your homework. Likewise, consulting external resources is part of being a good astronomer, but the final synthesis should be your own.

Two general rules for homework:
1) Please refrain from directly asking people who are not your colleagues for answers (e.g. don’t ask Chegg, ChatGPT, Reddit, etc.).
2) If you wouldn’t be able to explain to me why you took each step in your solution, you should not turn in that solution. (I reserve the right to ask you to explain your reasoning later).

Exams are your opportunity to demonstrate your individual understanding of the material, and therefore you may not consult anyone else’s work or resources other than your equation sheet.

Accessibility Statement:
The University of Montana assures equal access to instruction through collaboration between students with disabilities, instructors, and the Office for Disability Equity (ODE). If you anticipate or experience barriers based on disability, please contact the ODE at: (406) 243-2243, ode@umontana.edu, or visit www.umt.edu/disability for more information. Retroactive accommodation requests will not be honored, so please, do not delay. As your instructor, I will work with you and the ODE to implement an effective accommodation, and you are welcome to contact me privately if you wish.
**Course Schedule:**

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<th>Topics</th>
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<td>January 15</td>
<td>Syllabus; Telescopes beyond the optical</td>
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<tr>
<td>January 22</td>
<td>Telescopes beyond the optical; the Interstellar Medium</td>
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<td>January 29</td>
<td>Atomic &amp; Molecular Gas; Pre-MS evolution</td>
<td>HW1</td>
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<td>February 5</td>
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<td>February 12</td>
<td>Brown Dwarfs; Star Clusters; Midterm</td>
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<td>February 19</td>
<td>President's Day; Modeling Stellar Evolution (MESA)</td>
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<td>February 26</td>
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<td>HW4</td>
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<td>March 4</td>
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<td>March 11</td>
<td>Post-MS evolution; variable stars</td>
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<td>March 18</td>
<td>Spring Break</td>
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<td>April 8</td>
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<td>April 15</td>
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<td>April 22</td>
<td>FRBs; General Relativity; Black Holes</td>
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<td>April 29</td>
<td>Black Holes; Final Review</td>
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<td>May 8</td>
<td>Finals</td>
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