

**AST 3142: INTRODUCTION TO ASTROPHYSICS**  
**Mendel Hall 341**  
**Tue/Thr 11:30am-12:45pm**

**Spring 2025 Syllabus**

**Instructor:** Prof. Dr Andrej Prša  
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**OFFICE HOURS**

Tue 9:30am – 11am  
Wed 9:30am – 11am  
Thu 9:30am – 11am  
other times by appointment

*In this class we value each person as part of a learning community for their insights, perspectives and opinions, irrespective of gender, gender identity, race, sexual orientation, disability, spiritual values, political beliefs or nationality. We celebrate diversity and highlight its principal role in enriching our academic, professional and personal lives.*

**Course homepage:**

<https://aprsa.villanova.edu/?q=astroph>

**Course description:**

Introduction to Astrophysics is a course that will equip you with the knowledge and understanding of physical processes in stars. In particular, we will talk about star formation, the equations of stellar structure, stellar evolution, stellar atmospheres, and asteroseismology. Our discussion will be driven by rigorous derivations, so strong mathematical background is a necessary prerequisite.

This course aims to offer a meaningful, empowering experience to every participant; we will build that rich experience together by devoting our strongest available effort to the class. You will be challenged and supported. Please be prepared to take an active, critical, patient, and generous role in your own learning and that of your classmates. Introduction to Astrophysics will teach and empower you to solve astrophysical problems independently. That said, the course will challenge you and allow you to grow academically, so continuous effort on your part will be expected and required.

**Course objectives:**

Once you have successfully completed the Introduction to Astrophysics, you will be able to:

- gain an extended knowledge of the workings of a star across all stages of its life;
- solve stellar astrophysics problems by using analytical, numerical and approximate methods;
- formulate and solve differential equations that drive stellar evolution;
- understand the physics behind commonalities and differences across the H-R diagram.

**Course material:**

- Francis LeBlanc – An Introduction to Stellar Astrophysics
- Carroll and Ostlie – An Introduction to Modern Astrophysics
- Onno Pols – Stellar Structure and Evolution (lecture notes)

## Course work and grading:

Good news first: there will be no final exam for this course. It is my intention to ameliorate the burden you face during finals, so I will not expose you to yet another stressor. In place of the final, you will get a homework assignment that will showcase your understanding of the covered material. The assignments will be made available shortly after midterm. The deadline for turning in the typeset assignments is the last week of class.

We will have three in-class tests covering each of the discussed topics: (1) stellar formation, (2) stellar structure and evolution, and (3) stellar atmospheres. The tests will be a mix of theoretical questions and numerical problems.

Every test carries 20% of the total grade. The final assignment carries 40% of the total grade. Each test will have an extra credit question.

If you are unable to take the test because of an illness or any other justifiable circumstance, you must notify me *before* the day of the test. If you notify me of your absence *after* the fact, it will not be excused unless you were demonstrably unable to contact me. Any circumstance that causes you to miss a class needs to be formally excused, i.e. by a doctor's note, Dean's approval, etc. Please note that "I visited a health center and they said you can call them to verify" does not count as a formal excuse. In the case of illness, please arrange to see a doctor.

The grading will be done according to the following breakdown:

0-56%	F	68-72%	C-	84-88%	B
56-60%	D-	72-76%	C	88-92%	B+
60-64%	D	76-80%	C+	92-96%	A-
64-68%	D+	80-84%	B-	96-100%	A

## The use of generative AI for the assignment:

Generative AI chat bots (ChatGPT and similar) are allowed to be used as aid in preparing the assignment, with a few caveats. The most important caveat: do not let AI think for you. If it generates the code for you, and you do not understand the code through and through, you will not be able to experiment with it. If you cannot explain the results and the thought logic in your write-up, that will not reflect well. AI can often make mistakes and you can be misled – after all, AI doesn't actually write code: it appropriates it from the open internet. In doing so, it will get things wrong and you may end up chasing those mistakes and burning time when you could be analyzing your results. Finally, you must not use generative AI for writing any part of your report: that is entirely on you. Using AI for writing reports is considered plagiarism and will be treated as such. All that said: generative AI is a tool, much like stack overflow or reddit – if it helps you be more effective, by all means use it. Just do not think it will do the work for you: it will not.

## Attendance:

Regular attendance is essential for understanding the course material. Please arrive to class on time, and please refrain from disrupting class by using computers/phone or by frequent bathroom breaks.

**Academic integrity:**

Working together with your peers is strongly encouraged. Copying from your peers, on the other hand, either code or results or any part of the report, is strictly prohibited. You and you alone are responsible for the work that you turn in: if you cannot explain or justify it in the write-up, that is a red flag. Any copying during the test will also be sanctioned, irrespective of whether you copy someone's work or someone copies your work.

Finally, here goes the standard blurb: any violation of the Code of ethics will be grounds for failing the course. Any cheating, copying, duplication of work, etc, will result in a 0 for that test or the final assignment. A repeated offense will cause you to fail the entire class. If you have any concerns about your standing in class, come talk to me in due time and we will figure it all out.

**Special needs:**

It is the policy of Villanova University to make reasonable academic accommodations for qualified individuals with special needs. If you are a person with a special need please contact me after class or during office hours and make arrangements to register with the Learning Support Office by contacting 610-519-5176 or at [learning.support.services@villanova.edu](mailto:learning.support.services@villanova.edu) as soon as possible. Registration is needed in order to receive accommodations.