

# ASTR 367/702 – Stellar Structure

**Instructor:** Dr. Loren Anderson

**Contact details:** loren.anderson@mail.wvu.edu, 304-508-8486

**Office hours:** Thursdays 2:00-3:00, and by appointment

**Class times:** M/W/F 9:30-10:20 in G04 White Hall

**Aim:** The goal of this course is to give you a good understanding of stellar properties, how stars generate energy, and how stars are born and die. We will become familiar with the properties (e.g. temperatures, ages, chemical compositions) of stars and the different states of matter that make up stars. We will understand hydrostatic equilibrium, nuclear fusion and energy transport. We will follow the lifecycles of different types of stars and understand the properties of the different end-points.

We will concentrate on understanding the physics of stars using simple calculations covering a very large range of physical principles. Many of our calculations will be order-of-magnitude and back-of-the-envelope. Secondary goals of the course are to understand what the current important problems in the field are, and to be able to interpret and communicate scientific results that are related to the topics we will cover. The physics we will cover has a very broad range of applications, and the approach to problems should help in tackling difficult problems in many areas of physics.

This will be a combined grad/undergrad class, something we are trying in the department so that our course enrollment stays high. The content will be the same, but grad students will be expected to do extra homework and midterm questions.

**Prerequisites:** No astronomy knowledge is assumed. Introductory physics and calculus are mandatory.

**Text:** The main textbook for this course is An Introduction to the Theory of Stellar Structure and Evolution by Prialnik. You should also get:

An Introduction to Modern Astrophysics by Carroll and Ostlie

Useful for radiative transfer is:

Radiative Processes in Astrophysics by Rybicki and Lightman

**Homework and Exams:** Homework will be assigned roughly weekly, to be due IN CLASS one week later. I encourage you to talk with each other about the homework, but the actual solutions must be your own. Late homework will not be accepted, but I will drop your lowest one at the end of the semester. There will be two in-class exams and a final exam. The in-class exams will not be cumulative but the final one will be (though it will mostly cover the material in the last third of the course). These obviously must be done completely on

your own! If you cannot make an exam, please let me know in advance so you can take a makeup exam in advance. If you miss the exam without letting me know in advance, you will receive a zero grade.

**Attendance:** There is no specific attendance requirement for this course. However, since we will have lots of class discussions and since I will pull material from several different sources for the lectures, you will do much better in the course if you attend.

**Grading:** Your grade will be comprised of the following parts:     50% Homework  
15% Exam 1  
15% Exam 2  
20% Final Exam

You will get at least the following letter grades for the following percentage grades in this course.

85-100% A

75-85% B

65-75% C

50-65% D

< 50% F

**Social Justice Statement:** The West Virginia University community is committed to creating and fostering a positive learning and working environment based on open communication, mutual respect, and inclusion. If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with the Office of Accessibility Services (293-6700). For more information on West Virginia University's Diversity, Equity, and Inclusion initiatives, please see <http://diversity.wvu.edu>.

**Academic Dishonesty Statement:** The integrity of the classes offered by any academic institution solidifies the foundation of its mission and cannot be sacrificed to expediency, ignorance, or blatant fraud. Therefore, I will enforce rigorous standards of academic integrity in all aspects and assignments of this course. For the detailed policy of West Virginia University regarding the definitions of acts considered to fall under academic dishonesty and possible ensuing sanctions, please see the Student Conduct Code:  
<http://catalog.wvu.edu/undergraduate/coursecredittermsclassification/>

Should you have any questions about possibly improper research citations or references, or any other activity that may be interpreted as an attempt at academic dishonesty, please see me before the assignment is due to discuss the matter.