

Fall 2013 Physics 396 Stellar Astrophysics

Professor

Dr. Jared Workman

Class Location

WS 366

Class Hours

Tue Thu 11:00-12:15

Text Book

Stellar Astrophysics, Francis LeBlanc

Note: I will be using material from other sources rather heavily, if you miss class please get notes from classmates. I expect you to do independent research using the library and internet when studying for this course. I choose this book because it was decent and cheap. The next alternative was over 200 dollars.

Course Website

<http://myhome.coloradomesa.edu/~jworkman/teaching/fall13/396/syllabus396.pdf>. If you ever forget the link to this site go to www.jaredworkman.com and scroll down to the “My Colorado Mesa University Webpage” link.

Welcome to Physics 396, Stellar Astrophysics

This syllabus is your guide to class policies and procedures as well as a tool for planning. Each student is encouraged to work with the instructor and their peers.

Course objectives

Learn (Topical Course Outline)

- The Fundamentals of Stellar Astrophysics
 - o Basic Concepts
 - o Stellar Formation
 - o Radiative Transfer
 - o Stellar Atmospheres
 - o Stellar Interiors
 - o Stellar Evolution
 - o Nucleosynthesis
 - o Stellar Remnants

What to look for in this syllabus

- How to contact me
- Evaluation
- Grading
- Homework
- Project

- Attendance
- Reading Schedule
- Suggested Readings
- Resources for student assistance
- Class Policies
- Important Dates
- Student Learning Outcomes
- Course Learning Objectives
- Work Load

How to Contact Your Instructor

Visit my office: WS 230C

Office Hours: Mon 10:00-12:00, Wednesday 2:00-3:00, Thursday 1:30-2:30, Friday 11:00-12:00

Leave me a message at: (970)-248-1327

Email me at: <mailto:jworkman@coloradomesa.edu>

Evaluation

Homework 60%

Project 35%

Oral 5%

Attendance – see below

You'll notice I am not giving exams. I expect you to do a good deal of independent studying outside of class because of this. I encourage you to use the internet and library in doing the homework as it will not be all doable with the in class text.

Grading

Grades will be assigned as follows:

Excellent	A	> 90%
Good	B	80%-90%
Average	C	70%-80%
Deficient	D	60%-70%
Failing	F	< 60%

A curve may be used at the end of the semester. I can be contacted at any time to give you an update of your current grade.

Homework

- There will be roughly one assignment per week/two weeks consisting of approximately 6-12 homework problems per assignment. Assignments are to be turned in by the end of class on the date due. Late assignments will be penalized by a 25% grade reduction each day they are late.
- You are encouraged to discuss homework problems with your classmates. Working problems with your peers is an excellent learning method, however, anything turned in **must** be your own work. If you work with another student be sure to note this on your assignments
- If you work problems together on a blackboard and hand in identical assignments the credit will be split equally amongst participants.
- Homework is worth 65% of your grade.

- There is a great deal of freely available solutions to everything in almost any book on the internet. I've decided against cross checking to see who is/isn't using it. Its up to you to decide whether you want to learn the material or just pass.

Project

There will be a major project required for this course. This will include a research paper with a minimum of ten pages and a 15-20 minute presentation to the class to be given the last week of classes prior to the final. The paper will be worth 25% of your course grade, the presentation will be worth 10%. You may not exceed 20 minutes for the talk, please come by and practice it with me beforehand.

Students will work in groups of two on this project. The project may incorporate a numerical component if students are interested and I have two codes which may be used. If students wish to incorporate numerics they will be required to schedule at least two one hour sessions with me outside of class times for instruction.

You need to pick your partner and topic by the third week of class. I am requiring each group do a different topic so pick fast or your choice might be gone. I will describe the parameters of the paper in more detail in person once you have chosen your topic.

Both partners must contribute to the effort. Please come to me if you find yourself having issues with your partner. If one person in a group is doing the majority of the work I will break the group into individuals.

A first draft of the paper and in class presentation must be finished and presented to me by the week of November 18th. Students will need to schedule office time with me to go over the paper and the presentation during this week. Within two days of handing in the rough draft each student will be given an independent oral examination on the material contained therein. This is to ensure that you have a proper understanding of the material being covered as well as to ensure both partners are doing their due diligence. Following the oral exam I need 10 minutes with the group to go over corrections to their presentations.

Failure to have a first draft of both will result in a 20 percent penalty on the project grade and a loss of 5% for the oral exam.

The presentation will be graded on clarity and conciseness, generally one slide per 90 seconds is a good rule of thumb. I will also be grading you on how you handle questions and overall class feedback.

The topics you may choose from are

- Evolution of a low mass star from birth to death
- Evolution of a high mass star from birth to death
- Detailed description of various supernovae
- Gamma Ray Bursts
- Cataclysmic Variables
- Variable Stars/Strange Stars
- You pick and run it by me

You may find the following sites useful

<http://adswww.harvard.edu/>

<http://arxiv.org/>

<http://stellar.dartmouth.edu/>

<http://www.astro.wisc.edu/~townsend/static.php?ref=EZ-Web>

http://mesa.sourceforge.net/how_to_use_mesa_star.html

<http://jila.colorado.edu/~pja/astr3730/>

Attendance

This is up to you. I highly encourage you to come as this is not generally good self study material. Like the homework, attendance is a key factor in passing a course of this difficulty but you are far enough along in your studies that I don't penalize you for attendance.

Reading Schedule

Reading assignments will be given in class. I do not expect to finish the entire textbook and will supplement several chapters with my own notes.

Suggested Reading

Carroll & Ostlie, An Introduction to Modern Astrophysics, 2nd ed. (ISBN 0-8053-0402-9).

Erika Böhm-Vitense, Introduction to Stellar Astrophysics: Volume 1, (ISBN 0521348692) Volume 2, (ISBN 0521348706), Volume 3 (ISBN 0521348714)

Resources for Students

Your instructor: I am here to help you learn; please let me know if you are having trouble with anything! My contact information is at the top of the syllabus, or you can talk to me after class or during my office hours.

The Course Website: Contains all class information and several helpful (and some just fun) links.

Tutorial Learning Center: HH113 <http://www.coloradomesa.edu/tutoring/index.html>

Students With Disabilities: Students with disabilities have certain privileges extended to them including but not limited to extended exam time. It is your responsibility to contact the EAS (Educational Access Services) At Houston Hall, Room 108, 1-970.248.1856 <http://www.coloradomesa.edu/eas/links.html> and bring me the necessary forms for any special dispensations received.

Class Policies

All students expected to follow the Student Code of Conduct. Violations of the Student Code of Conduct may result in disciplinary action. The code of conduct is here

http://www.coloradomesa.edu/academics/policies/academic_integrity.html. Some specific items that are important in this class are:

1. Create and sustain a respectful learning environment. Allow your fellow students to learn and the instructor to teach. Disrespectful, disruptive or abusive behavior toward an individual or group is unacceptable.
2. Due to the rapid pace of this course, late work is generally not accepted. In the event of illness, family emergency or other special circumstances, you must contact me BEFORE the deadline to make arrangements for late work or early tests. At the instructor's discretion, you may then turn in the work within 1 week of the deadline.
3. I encourage participation, ask questions, email me, ask for reading material for your own edification after the course is over, provide me with feedback. I am not directly grading you on participation but it will play a factor in the end of the semester grade. This is an interesting topic and I want you to be involved in learning it.
4. Turn off your cell phone.
5. No smart phones, ipads, earphones, etc during class time, no texting or web browsing. You all get one freebie phone ring then I may ask you to leave.
6. Laptops are fine for note taking but please do not web surf during class. If I find you surfing the web you forfeit your laptop privileges. Students using laptops are required to sit at the front of the class.
7. I will turn any students I find cheating, copying each other's work, or plagiarizing material over to the department chair, no exceptions. If you are unsure if something is prohibited, ask me. You are encouraged to work together but please do not hand in identical assignments, they will not be accepted.
8. Please arrive to class on time and wait until class is over to leave. Repeated late arrivals will result in a student being removed from the class.
9. It is your responsibility to learn of any missed work.

Important dates:

<http://www.coloradomesa.edu/registrar/dates.html>

Student Learning Outcomes

The physics program has several learning outcomes that will be attained by graduates of the program; this course contributes to the attainment of these two objectives

- 1) Articulate the knowledge base and show fluency with the ideas and techniques of the major fields of physics (classical mechanics, electromagnetism, statistical physics and quantum theory).
- 2) Translate physical problems into mathematical problems, solve these using appropriate mathematics and extract physically meaningful statements from the solutions.

Course Learning Objectives

- Use an understanding of light and its interactions with matter in order to analyze astronomical data including optical and non-optical imaging and basic spectroscopy.
- Explain the basic physical properties of stars and how we have determined them.
- Explain our theoretical understanding of stellar interiors, specifically the conditions necessary for hydrostatic equilibrium, as well as applying that understanding to other astronomical situations.
- Explain stellar evolution, not only why we think stars evolve, but where the evidence for various states of their evolution comes from.
- Explain the fundamentals of radiative transfer and spectral line formation.
- Explain the properties of the various types of supernovae and stellar remnants.

Work Load:

An undergraduate student should expect to spend on this course a **minimum** of two hours outside the classroom for every hour in the classroom. The outside hours may vary depending on the number of credit hours or type of course. More details are available from the faculty member or department office and in CMU's Curriculum Policies and Procedures Manual.

Disclaimer:

The instructor reserves the right to modify the schedule. It is tentative based on class progress.