ASTR 301 – Modern Astrophysics I
Fall 2018
MWF 11:10 am–12:00 pm, LL 511

Instructor:

Prof. Ginny McSwain
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office hours: drop in or by appointment

Course Objectives:

1. To demonstrate how fundamental properties (including distance, brightness, mass, radius, and temperature) of stars can be measured;
2. To apply mathematical and physical models to describe the atmosphere, internal structure, and evolution of stars;
3. To understand how stars generate energy via nuclear reactions;
4. To use computational programs to vizualize astronomical data;
5. To work within a team and combine astronomical data analysis and theoretical modeling to describe the state of a binary star.

Required Materials:

- Ryden & Peterson, "Foundations of Astrophysics", 1^{st} edition
- A Python programming tool with visualization capabilities (Anaconda and Jupyter are the recommended tools. Both are free to download.)
- A scientific calculator with trigonometric and logarithmic functions

Grading:

Homework – 20%
Hour Exam 1 – 20%
Hour Exam 2 – 20%
Group Project – 20%
Final Exam – 20%

Attendance is strongly recommended but not required. Late homework will be penalized by 5% per day late (up to 30% maximum), and makeup exams are not allowed, without a valid excuse. If you have a valid excuse, the professor will set a reasonable deadline to complete the work.

Academic Integrity:

Academic dishonesty will not be tolerated on any assignment. Copying work from other students or outside sources is considered plagiarism. Outside references (other than the class textbook) must be properly cited if used on any assignment. If I have evidence of copying, cheating, plagiarism, or any other dishonest behavior, I will not hesitate to report my suspicions to the Office of Student Conduct. Their penalties may range from assigning a zero for that assignment, assigning an F for the final course grade, and even expulsion from the university. Please consider this your final warning.

For every assignment, please ensure that the work that you turn in is your own work. You may collaborate on homeworks and group assignments, but not exams. Good collaboration means discussing the problem solving strategy together, and it is a useful learning tool. But, at no time should you share your homework answers with anyone else. Allowing someone to copy your answers makes you just as guilty as the copier. If someone asks you something like, "What did you get for Problem 2?" you should not provide the final answer. You may, however, tell them what equation you used or refer to the textbook or notes together and discuss the general topic. When you write your solutions, all mathematical calculations and written explanations must reflect your own work. Showing all of the steps of your calculations and explaining your reasoning throughout a problem is an excellent way to guard your independent work and remove suspicions of academic dishonesty.

Accommodations for Students With Disabilities:

If you have a disability for which you are or may be requesting accommodations, please contact both the professor and the Office of Academic Support Services, Williams Hall, Suite 301 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

The Principles of Our Equitable Community:

Lehigh University endorses The Principles of Our Equitable Community[1]. We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.

[1] https://www.lehigh.edu/~inprv/initiatives/PrinciplesEquitableCommunity-Individuals.pdf

Tentative Schedule:

Week of Aug. 27:	**No class (prof. traveling)**; **Independent study:** Python and Jupyter Notebooks (See 6 tutorials on Course Site)
Week of Sept. 3:	Early Astronomy: Measuring positions and brightness (§1.1–1.3, 13.1-13.4)
Week of Sept. 10:	Orbital Mechanics & Binary Stars (§3.1–3.4, 13.5–13.6)
Week of Sept. 17:	Orbital Mechanics (cont.); Light and Matter (Ch. 5)
Week of Sept. 24:	Light and Matter (cont.); Stellar Atmospheres (Ch. 14)
Week of Oct. 1:	Stellar Atmospheres (cont.)
Week of Oct. 8:	**Exam 1 Oct. 8**; Discussion of group project and related resources
Week of Oct. 15:	**Pacing break Oct. 15**; Stellar Interiors (Ch. 15)
Week of Oct. 22:	Stellar Interiors (cont.)
Week of Oct. 29:	The Sun (Ch. 7)
Week of Nov. 5:	The Interstellar Medium (Ch. 16)
Week of Nov. 12:	Formation and Evolution of Stars (Ch. 17)
Week of Nov. 19:	**Exam 2 Nov. 19**; **Thanksgiving break Nov. 21–23**
Week of Nov. 26:	Formation and Evolution of Stars, cont.
Week of Dec. 3:	Stellar Remnants (Ch. 18)
	Group projects due Dec. 7
Date TBA	**Final Exam**

This syllabus is only a tentative outline of the course. The grading policy, dates of exams, or the topics covered in class may change as needed.