ASTR 302 – Intro to Galactic and Extragalactic Astrophysics
Spring 2024
MW 1:35–2:50
LL 512

Instructor:

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Office: LL 405
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office hours: drop in or by appointment

Course Objectives:

1. To describe the stellar populations that make up the Milky Way and other galaxies;
2. To apply mathematical and physical models to describe the structure and kinematics of galaxies;
3. To use state-of-the-art astrophysical data to test these models;
4. To describe the evolution and history of the Milky Way and other galaxies;
5. To use computational programs to visualize astronomical data.

Course Materials:

- Our course will not rely strictly upon any particular textbook. If you used *An Introduction to Modern Astrophysics* by Carroll & Ostlie for ASTR 301, that will be a good reference for much of our material.
- Another useful (optional) text is *Galaxies in the Universe* by Sparke and Gallagher. A free pdf copy is included on our Course Site page.
- We will make extensive use of Python for programming and data visualization capabilities. Anaconda (including JupyterLab) is the recommended platform. It is free to download to your own computer, or you can use Jupyter free through the NOIR DataLab or with Google CoLab.
- You may also need a scientific calculator with trigonometric and logarithmic functions.

Grading:

Weekly Concept Quizzes – 30%
Homework – 50%
Final Project – 20%

If you know in advance that you will need an extended deadline on an assignment, please let me know as soon as possible, and I'll gladly work with you to reschedule a reasonable deadline without requiring documentation. **If you miss a deadline that has already passed** and want to arrange for accommodations, I may require documentation of a valid excuse. I will apply a penalty of 5% per day (up to 30% maximum) for late assignments without a valid excuse.

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, but not quizzes or 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:

Lehigh University is committed to maintaining an equitable and inclusive community and welcomes students with disabilities into all of the University's educational programs. In order to receive consideration for reasonable accommodations, a student with a disability must contact Disability Support Services (DSS), provide documentation, and participate in an interactive review process. If the documentation supports a request for reasonable accommodations, DSS will provide students with a Letter of Accommodations. Students who are approved for accommodations at Lehigh should share this letter and discuss their accommodations and learning needs with instructors as early in the semester as possible. For more information or to request services, please contact Disability Support Services in person in Williams Hall, Suite 301, via phone at 610-758-4152, via email at indss@lehigh.edu, or online at https://studentaffairs.lehigh.edu/disabilities.

The Principles of Our Equitable Community:

- We affirm the inherent dignity in all of us, and we maintain an inclusive and equitable community.
- We recognize and celebrate the richness contributed to our lives by our diverse community.
- We promote mutual understanding among the members of our community.
- We confront and reject discrimination in all its forms, including that based on age, color, disability, gender identity, genetic information, marital status, national or ethnic origin, political beliefs, race, religion, sex, sexual orientation, socio-economics, veteran status, or any differences that have been excuses for misunderstanding, dissension, or hatred.
- We affirm academic freedom within our community and uphold our commitment to the highest standards of respect, civility, courtesy, and sensitivity toward every individual.
- We recognize each person's right to think and speak as dictated by personal belief and to respectfully disagree with or counter another's point of view.
- We promote open expression of our individuality and our differences within the bounds of University policies.
- We acknowledge each person's obligation to the community of which we have chosen to be a part. We take pride in building and maintaining a culture that is founded on these principles of unity and respect.

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.

Tentative Schedule:

Week of Jan. 22:	Python and Jupyter Notebooks
Week of Jan. 29:	Our Galactic toolkit (ASTR 301 review)
Week of Feb. 5:	Historical approaches to Galactic astronomy; Galactic morphology
Week of Feb. 12:	Kinematics of the solar neighborhood
Week of Feb. 19:	The inner Milky Way
Week of Feb. 26:	Mass distribution and gravitational potential of the MW
Week of Mar. 4:	Stellar interactions; Chemical history of the Milky Way
Week of Mar. 11:	**Spring Break**
Week of Mar. 18:	Computing Center visit and virtual reality intro
Week of Mar. 25:	Spiral and elliptical galaxies
Week of Apr. 1:	Quasars and active galactic nuclei
Week of Apr. 8:	No classes this week; Ind. study of gal formation & evolution
Week of Apr. 17:	Large scale structure and expansion of the universe
Week of Apr. 24:	Cosmology
Week of May 1:	Student presentations

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.