

Astronomy

Stars, Galaxies and the Big Bang

PHYS108 - Spring 2023

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Overview and basic info

Course info

Classroom: Hugel 142

Time: 1:10-4:00pm M, 1:10-2:00pm WF

Textbook: 21st Century Astronomy, 7th Edition (Palen, & Blumenthal) with [online access](#)

Office Hours: MW 2-3pm (Hugel 142), other times TBD

Instructor

Dr. Stephanie Douglas

Please call me “Professor Douglas” or “Doctor Douglas” or “Professor”

My pronouns are she/her/hers

Email: douglste@lafayette.edu

Office: Hugel 022 (but office hours may be held elsewhere)

Course Policies

Attendance required, let me know ASAP if you will be absent

This class will be taught in person. All class and lab sessions will proceed assuming everyone is participating synchronously, and you will be graded on your participation in class activities. If you must miss class or lab sessions, please let me know as soon as possible. You are responsible for completing the day’s work to receive participation credit for that day.

Your health is always paramount, but even more so this semester. For minor illnesses, just let me know and I will waive participation for that day. **Please do not attend class if you are experiencing COVID-19 symptoms.**

If you will miss multiple classes due to COVID-19 or another serious illness, let me know ASAP and work with your local health provider (if applicable) and Bailey Health Center to obtain a Dean’s Excuse. Dean’s Excuses are also available for other disruptive life events. If you have a Dean’s Excuse, you will not be required to use the time bank, and participation grades will be waived for the time you were out.

If you will miss class, lab, or an assignment deadline due to a religious holiday, please **contact me by the add/drop deadline** so we can make plans for you to complete the relevant work.

Masks required

Wearing a mask is known to reduce the transmission of SARS-CoV-2, the virus responsible for COVID-19. Regardless of your vaccination status, to protect the health of our class, masks must be worn during classes and labs. Masks should be made of a tightly woven cloth or non-woven synthetic filtering material, and should be worn properly over the nose and mouth and secured on the chin ([CDC mask recommendations](#)). Food and drink must also be consumed outside of the classroom. Students who show up to class without a mask will be asked to return to class wearing one in order to protect the health of our classroom community. In the event that you do not have access to a mask to wear during the class session, please let me know and I will help you obtain one.

Contact and office hours

Open drop-in “contact” or “office” hours are listed above. You do not need an appointment to stop by! If you would prefer to meet virtually for office hours, I will also keep a Zoom link open.

I also have blocks of time each week for one-on-one meetings; if these times don’t work for you, please email me. One-on-one meetings will be virtual unless we both agree otherwise.

I generally check email between 10-6 on weekdays, and reply by the end of the next weekday. You may send me an email at any time! I just don’t guarantee a response outside these hours.

I expect you to check email (and read any announcements) at least once between each class.

Contingency plan for virtual meetings

Ideally we will be able to maintain in-person classes this semester. However, COVID-19 or weather may temporarily require us to switch to Zoom meetings. I will let you know as far in advance as possible if this is necessary. The Zoom link will be posted to Moodle.

Hopefully we’re all familiar with virtual class etiquette by now. Mute your mic when you’re not speaking, raise your hand physically or virtually to speak, be polite in the chat, etc. I would appreciate it if you keep your cameras on - if this isn’t possible, please [set up an appropriate profile picture](#) so that I’m at least not talking to blank squares.

Accommodations: flexible, let me know as early as possible

My policy. Your success in this class is important to me. If you need accommodations for any reason, please speak with me privately ASAP to discuss reasonable accommodations. I am happy to consider creative solutions as long as they do not compromise the learning goals of the activity.

Mandatory statement for any Lafayette course with a disability policy. Lafayette College is committed to creating a learning environment that meets the needs of its diverse student body. If you anticipate or experience any barriers to learning in this course, you are welcome to

discuss your concerns with me. If you have a disability, or think you may have a disability, please meet with the [Office of Accessibility Services](#), to begin this conversation or request an official accommodation. If you have already been approved for accommodations through the Office of Accessibility Services, please meet with me so we can develop an implementation plan together.

Collaboration and Plagiarism

You are expected to abide by the principles of intellectual honesty outlined in the [Lafayette College Student Handbook](#). All answers must be given in your own words, not copied from the textbook or any other resources. Copying solutions from another source is a violation of the [Academic Integrity Policy](#). This includes Chegg, Bartleby, CourseHero, or similar websites; instructor/publisher solutions; the work of past students; or anything you can find on Google. Use of large language models (LMM) such as ChatGPT to generate text or project components is also prohibited.

Science is a social enterprise, and I encourage you to collaborate with your peers on homework, in-class activities, labs, studying, etc. “Collaboration” does not mean “copying.” You must understand and individually write out your own answers, and you must turn in your own copy of each assignment (unless otherwise noted).

You may not work collaboratively on projects, unless otherwise noted.

Evidence of plagiarism or other academic dishonesty will be reported to the College.

Commitment to Inclusion and Equity

Lafayette College is committed to creating a diverse community: one that is inclusive and responsive, and is supportive of each and all of its faculty, students, and staff. The College seeks to promote diversity in its many manifestations. These include but are not limited to race, ethnicity, socioeconomic status, gender, gender identity, sexual orientation, religion, disability, and place of origin. The College recognizes that we live in an increasingly interconnected, globalized world, and that students benefit from learning in educational and social contexts in which there are participants from all manner of backgrounds. The goal is to encourage students to consider diverse experiences and perspectives throughout their lives. All members of the College community share a responsibility for creating, maintaining, and developing a learning environment in which difference is valued, equity is sought, and inclusiveness is practiced.

If you are experiencing discrimination or harassment in this class, please do not hesitate to reach out to me so that I can help resolve the issue.

Do not repost learning materials, do not create your own recordings

All course materials are proprietary and for class purposes only. This includes posted recordings of lectures, worksheets, discussion prompts, and other course items. Such materials should not be reposted, and should be deleted at the end of the semester. Online discussions should also

remain private and not be shared outside of the course. If you have any questions about proper usage of course materials feel free to ask me. You may not record classes yourself.

Mandatory Moodle privacy statement

Moodle contains student information that is protected by the Family Educational Right to Privacy Act (FERPA). Disclosure to unauthorized parties violates federal privacy laws. Courses using Moodle will make student information visible to other students in this class. Please remember that this information is protected by these federal privacy laws and must not be shared with anyone outside the class. Questions can be referred to the Registrar's Office.

Assignments and grading

Unless otherwise noted, all assignments must either be completed entirely within Moodle or Norton Smartwork. Submissions to Moodle must be uploaded as PDF files or Kaltura video submissions. Work that is uploaded as an image straight from your camera will not be graded.

Course Grade Components

Attendance and class participation: 10%
Pre-class work/reading "quizzes": 10%
Labs: 15% + 5%
Homework: 20%
Midterm projects: 2 x 12%
Final project: 16%

Three 48-hour free passes to extend deadlines

Over the course of the semester, you will have three 48-hour passes that you can use to extend deadlines for homework, labs, or projects, no questions asked. You may combine 2 or 3 of these passes on a single assignment, but you may not subdivide the 48-hour increments. The only exception is the final project - you may only use 1 pass on the final. To use a pass, just email me (either ahead of time, or when you turn the assignment in), indicating the number of passes you would like to use.

Late work policy: 3% off per 24 hours late

I will accept late homeworks until the solutions and grades for that assignment are posted (typically one week after they're turned in). Once solutions and grades are posted, no late assignments will be accepted without prior approval. If you do not use the time bank, late assignments will be penalized by 3 percentage points per 24 hours after the assigned deadline, up to 25% of the total points for that assignment. **Late work will still be accepted through the last day of class; you are on your honor not to get solutions from your classmates.**

Pre-class work and reading quizzes (10%)

Reading and pre-class assignments will be assigned ahead of each lecture, generally at least 1 week in advance. These assignments may include watching videos or exploring interactive apps ahead of the class. The goal of the pre-class work is to increase the amount of interaction during our synchronous class time, and minimize the time you're spending watching me talk.

Expect to spend 3-4 hours actively reading and interacting with pre-class material per week. Use the listed learning goals to guide your reading. As part of these assignments, you will take small quizzes and/or submit short reflections on the content. These will be graded for completion only.

(If it becomes clear that many students are not completing pre-class work, the reading quizzes will be graded for accuracy.)

Attendance and class participation (10%)

Showing up to class is the bare minimum for receiving participation points. You can also increase your participation score by participating in poll questions, group work, and other in-class activities, and by attending office hours.

Labs (15% + 5%)

Lab periods will generally involve extended activities intended to help you uncover challenging concepts and to meet the Natural Science requirements of the Common Course of Study.

Lab grades will be based on the following

- A completed worksheet or brief report turned in at the end of the lab period (one per group) (6/10 points)
- Accuracy of responses on the group worksheet (4/10 points)

Two lab reports late in the semester will be graded entirely for accuracy, since they involve methods you will have seen several times by then. These two labs will account for an additional 5% of your course grade.

Homework (20%)

Each week you will be assigned about 1 hour of homework consisting of conceptual questions, sketches, diagrams, math problems, and other tasks that suit the content from the previous week. I encourage you to work together on homework, though you must turn in your own copies of each assignment. It must be clear that short answer/essay questions were written in your own words.

You will generally submit homeworks via Norton Smartwork. Some questions won't be automatically graded - for those questions, I will generally grade them and post solutions within one week. I will drop your lowest homework grade. **Homeworks will be due on Fridays at 5pm.**

Midterm and final projects (12%, 12%, 16%)

There will be three projects in this class: two midterm projects and one final project. Each project will consist of an essay, video, or other product. You will have several choices for prompts on each project.

Each project will require a draft due 9 days before the overall project due date.

You may consult your book, class material, and me for your projects. You may consult some outside sources as long as you cite them and paraphrase all material in your own words. You may not work with other students on projects unless you talk to me first.

Course Outcomes

After completing this course, you will be able to...

- understand the scientific method and how it can be applied to the universe as a whole;
- understand that the universe evolves along with everything in it;
- gain perspective on the place of humankind in the cosmos;
- discuss, in general terms, the nature and evolution of stars;
- discuss, in general terms, the nature and evolution of galaxies;
- discuss, in general terms, the conditions that prevailed at much earlier times in the expansion of the observable universe;
- understand that the goal of physics is to comprehend phenomena in the physical world;
- demonstrate the ability to formulate a testable hypothesis based upon physical data;
- collect and analyze experimental data relevant to testing a hypothesis;
- evaluate whether evidence supports, refutes, or leads to the revision of the hypothesis;
- create, interpret, and critically evaluate graphs, tables and models of physical data;
- understand scientific uncertainty and how it is reduced;
- distinguish between scientifically testable ideas and opinion.

In addition to the outcomes listed above, this course will promote the outcomes from the Natural Sciences section of the Common Course of Study. You will be able to...

- NS 1: Employ the fundamental elements of the scientific method in the physical and natural world by identifying and evaluating a testable scientific hypothesis.
- NS 2: Create and evaluate descriptions and representations of scientific data via equations, graphs, tables, and/or models.

Specific learning goals for each unit will be distributed weekly.

Student work in this course is in full compliance with the federal definition of a 4 credit hour course.

Planned course schedule (subject to change)

Specific learning goals for each unit will be distributed weekly.

Textbook: 21st Century Astronomy, 7th Edition (Kay, Palen, & Blumenthal) with [online access](#)

Week	Dates	Ch.	Topic	Other notes
1	Jan 24 - 28	1	Our place in space, scientific method	Lab: intro/setup
2	Jan 31 - Feb 4	13.1, 3	Parallax and motion	Lab: parallax/spreadsheets Add/drop deadline Friday
3	Feb 7 - 11	4, 5	Gravity and Light	Lab: Newton's Version of Kepler's 3rd Law
4	Feb 14 - 18	5, 6	Light and Telescopes	Lab: Spectroscopy
5	Feb 21 - 25	5, 13	Observing the stars, I	Lab: SDSS Colors of Stars
6	Feb 28 - Mar 4	13	Observing the stars, II	No Lab (regular class on Monday) Draft of Project 1 due Monday 5pm
7	Mar 7 - 11	15	Star formation	Lab: SDSS Stellar Spectra Midterm Project 1 due Wednesday 5pm
	Mar 14 - 18	7-8		Spring break, no classes Daylight Saving Time starts
8	Mar 21 - 25	15, 16	Star formation and low-mass stellar evolution	Lab: HR diagrams (Mid-term grades due)
9	Mar 28 - Apr 1	16, 17	Stellar evolution	Lab: Cepheids
10	Apr 4 - 8	17, 18	Stellar remnants	Lab: Sgr A* (graded for accuracy)
11	Apr 11 - 15	19	Galaxies	Lab: WD SNe/Hubble's Law (graded for accuracy)
12	Apr 18 - 22	20	The Milky Way Galaxy	No Lab (regular class on Monday) Draft of Project 2 due Monday 5pm
13	Apr 25 - 29	21, 22	The Big Bang	Lab: Galaxy Rotation curves Midterm Project 2 due Wednesday 5pm
14	May 2 - 6	22, 23	The universe on very large and very small scales	Lab: Final Project Drafts due Friday 5pm
	Finals week			Last homework assignment due Final project due