

ASTR-2100 (Spring 2020) Guidelines for Independent PROJECTS

During the semester, you will get the chance to explore an astronomical topic that we don't have time to cover in depth during class. The choice of topic is entirely up to you. We've listed a number of suggestions and pointers below, but feel free to think even more outside the box. Some details:

- The project accounts for one-ninth of your course grade. Please don't put it off until the last minute.
 - In Homework 3 (due Tuesday, March 10), you will write up a short summary of what you intend to do for your project. You're not 100% locked into this idea, but if you decide to change, you must let your instructor know as soon as possible after that.
 - **All projects are due on Monday, May 4.** Late submissions can be accepted up to Thursday, May 7, but will only earn up to 50% credit.
-

A. TOPIC:

You will focus on one specific "application" of the material covered in this course. Usually this topic will fall in the fields of astrophysics, planetary science, or solar/space physics. If you want to dig into something in a different field (say, laboratory physics, cosmo-chemistry, or aerospace engineering), that's probably okay, but we will have to approve the topic. It can be inspired by brand-new discoveries, or it can come from something that fascinated you in the pages of an old book. It *shouldn't* be something that we covered in-depth in class, though.

We encourage you to start looking at online resources that cover new discoveries in astronomy. Here are a few that go into more depth than popular-press news stories:

- [AstroBites](#) is a blog written by astronomy graduate students (some here at CU Boulder) that highlights newly published research results.
- [AAS Nova](#) is an online digest, from the American Astronomical Society, of recently published papers.
- NASA's [Astronomy Picture of the Day \(APOD\)](#) doesn't always link to newly published papers, but it often leads to timely water-cooler discussions about current topics.
- Of course, you can always dive into the deep end: [arXiv/astro-ph](#), the place where roughly 50 new astronomy research papers are posted every day!

Using one or more of these as a jumping-off point, you will dig a bit deeper, research your topic, and identify connections to the topics we cover in class.

B. MEDIUM:

There are several paths you can take to find the optimal way to present what you have learned:

1. **Review Paper:** The default is the standard research essay, on a topic that goes significantly beyond the material discussed in class. The paper must convey some background (i.e., how did we come to understand the topic), motivation (i.e., why is it relevant), and some quantitative exploration of the physics (i.e., showing some relevant equations and describing how they are solved).

The length to aim for is about **approximately 2000 words** (about 4–5 pages single-spaced, or 8–10 pages double-spaced), not counting snazzy figures (recommended) and a bibliography of cited sources (required).

For more information on essay-writing and citing sources, see:

- CU Boulder Writing Center: <https://www.colorado.edu/pwr/writing-center>
- A nice guide: http://lasp.colorado.edu/~cranmer/ASTR_1200_2019/edinburgh_writing_guide.pdf
- CU Libraries citation guide: <https://libguides.colorado.edu/strategies/citations>

2. **Computational Project:** If you have an idea to do some kind of mathematical or computational calculation that explores a topic relevant to the course, please let your instructor know about it. You may want to construct your own model or simulation, or even download some publicly available data to analyze. You would still need to write a paper describing what you did (roughly the same length as the review paper option), but it can be filled mainly with the results and not as much “deep background” as in the review paper option. Feel free to use whatever tools you want (i.e., computing languages, software packages, output formats), but **instructor approval is needed.**
3. **Interactive Web Page:** Some information is not well-suited for the “static” essay format. Maybe you’d like to take advantage of wiki-like hyperlinking, to show how different ideas are interconnected. Maybe the best way to “view” the thing you want to show is to have an interactive way for a user to play with it in real time. Maybe your writing just makes more sense as a blog or a BuzzFeed-style listicle (but with equations and cited sources). Let your creativity run wild, but **instructor approval is needed.**
4. **Interview an Expert?** Boulder is an active hub of astronomy and space activity. If you want to talk with one of the world’s experts in some topic relevant to this course—including graduate students and postdocs—we can help get you connected. Like the other project modes, you will still need to delve into the details of math & physics, but your expert may be unexpectedly pleased to be able to talk at that level! You should draft up your questions beforehand and record the interview as it happens (with the person’s permission, of course). Your final report should be roughly the same length as the review paper option. It should contain: your initial goals, what you hoped to learn, transcript excerpts from the interview itself, and a summary of what you learned. As with the other non-traditional options, **instructor approval is needed.**



Just to be clear, no matter which option you choose, you still need to research and cite **multiple sources** (not just the lecture notes and textbooks, and definitely not just Wikipedia!) so you can get a broad, but also detailed, view of the science.



HONOR CODE: As you already know from the syllabus, the CU Boulder [academic integrity policy](#) needs to be obeyed at all times, and this includes plagiarism. Some other local online guides that go into more detail about what plagiarism is, and how to avoid it, include the [writing guide](#) mentioned above, and a useful site at [CU Denver](#). It’s definitely not worth the risk to your academic career to go down that road.