Ay121: Undergraduate Radio Lab

UC Berkeley, Spring 2025

This course uses four laboratory experiments to introduce instrumentation, laboratory techniques, and data analysis. We will build receiving, observing, and analysis systems for two telescopes: a single-dish 21-cm line system and a 10-GHz interferometer. We will use these telescopes for astronomical observing projects that include: measuring the structure of the Milky Way galaxy, determining the position of several radio sources, and measuring brightness distributions with high angular resolution. There is an emphasis on digital data acquisition, software development, and high-quality written reports.

Prof. Aaron Parsons

Classes: M/W 1:00-3:00p

Location: Campbell 541, Zoom: https://berkeley.zoom.us/j/3587609756

Email: [aparsons@berkeley.edu](mailto:aparsons@berkeley.edu)

Office: Campbell 425, Zoom: https://berkeley.zoom.us/j/3587609756

Class Participation (30% of grade):

* Present (your own!) work each week at show and tell
* Keep up with the class schedule
* Actively engage in class discussion and lecture

Lab Reports (70%):

* due **Fridays** before midnight.
* -10% for each day late
* collaborate (talk, draw pictures, collect data) with your lab mates …
* … but implement separately (your own equations, code, plots, writing)
* … and acknowledge your resources (citations, AI assistance, etc.)

Reading:

* lab instructions and topics linked on the AstroBaki website
* https://casper.astro.berkeley.edu/astrobaki/index.php/Undergraduate\_Radio\_Lab

Materials:

* you may use department computers; an account has been made for you.
* lab book for notes, documenting experimental setups, meta data, etc.
* a Raspberry Pi (see AstroBaki→Setting\_Up\_Your\_Raspberry\_Pi)

Schedule:

* See class website (AstroBaki->Undergraduate Radio Lab)

Lab Rules:

* Do not prop open the lab door. Make sure it shuts behind you.
* No food or beverage in equipment areas. Keep the lab clean. Dispose of your trash.
* Do not disconnect or modify the wiring of any of the lab computers or monitors.
* Be respectful. Talk quietly, use headphones when listening to music, etc.
* Put equipment back where you got it when you are done.
* Be careful with equipment, but if you break something, please tell us.
* No email/games/social media on lab computers during class hours.

Getting Started:

* Follow instructions in Astrobaki→Getting Started in the Undergraduate Lab for 5th floor lab access
* Get a Raspberry Pi (see AstroBaki→Setting\_Up\_Your\_Raspberry\_Pi)
* Log in to ugastro.berkeley.edu and change your password
* Form a group with ~4 others for Lab 1

Class Conduct:

This is a work-intensive class. You are going to spend significant time in the lab with minimal supervision. At all times, you are expected to abide by the posted lab rules and the UC Berkeley Code of Conduct (<http://sa.berkeley.edu/code-of-conduct> ), acting with respect to your peers, GSIs, technicians, and instructor.

Should you experience any form of harassment or discrimination, we maintain a list of resources that can help you decide how to respond (<https://astro.berkeley.edu/department-resources/reporting-harassment> ). GSIs, technicians, and instructors are non-confidential reporters; we have a legal obligation to act on any reports of harassment, and we take our responsibility seriously.

Computing Support:

We are committed to ensuring that every student in our department is able to engage in our courses without incurring undue financial burdens. If you are in need of a personal laptop or other technology to complete academic work this semester, the Student Technology Equity Program (STEP) can provide need-based loans for a variety of hardware to Berkeley students. Applications are now open for the Spring 2025 semester: <https://studenttech.berkeley.edu/step>. We encourage you to apply as soon as possible as it may take 1-2 weeks for the application to be processed.

For shorter term access to technology, Berkeley Library offers first come, first serve laptop lending. These loans are only available for up to 14 days, so they are not a solution for a full semester, but can help for moments where you may need short term access to a computer, including the waiting period before your STEP loan is approved. See here for the checkout form and a complete list of offerings: <https://www.lib.berkeley.edu/about/device-lending-policy>.