

# Doing research as an undergrad

ASTR 2910 ★ Week 5

# Why do research as an undergrad?

1. To figure out if you like it!
  - a. Do you want to do this as a career?
  - b. Are there certain topics/methods you like (or don't like)?
2. To prepare for (and get into) graduate school

# When should you start?

It's never too early or too late!

If you're thinking about going to grad school:

- Applications will be due starting in December of your senior year
- You'll need to provide rec letters (usually 3) and write a personal statement
- Start as early as possible, and no later than the summer after junior year

# What are the prerequisites?

1. Basic physics and math (astronomy-specific knowledge not required)
2. Basic coding (preferably Python)
3. **Motivation (to put in the time to learn and look for your own answers)**

# What does research as an undergrad look like?

Undergrad research spans all subfields and methods.

Projects are typically small and well-defined:

- Data has already been obtained
- Your role is to lead the data analysis and help get/write up results
- Regular meetings with your mentor/group to discuss progress
- Opportunities to present your work

Expect to apply most of the skills learned in this class: reading papers, data analysis with Python, basic communication of results

# Two types of opportunities

*Neither is “better” for grad school – both provide legitimate research experience!*

## Option 1: Find your own advisor

- Flexible timeline (academic year or summer) and pacing
- How: Cold-emailing, networking, etc.
- Examples: Professors, postdocs, grad students

## Option 2: Apply to programs that match you to an advisor

- Usually during the summer and ~10 weeks long
- How: [AAS list](#), Google, [Columbia database](#), word of mouth
- Examples: [NSF REUs](#), Caltech [SURF](#)/[WAVE](#), [NASA CRESST](#), [DAAD](#) [RISE](#)...

# Compensation

## Course credit:




INDEPENDENT RESEARCH

ASTR3998UN

1 section ^

Satisfies Science Requirement (Columbia College and General Studies)

Prerequisites: the instructors permission. For an independent research project or independent study, a brief description of the proposed project or reading, with the supervising faculty members endorsement, is required for registration. A variety of research projects conducted under the supervision of members of the faculty. Observational, theoretical, and experimental work in galactic and extragalactic astronomy and cosmology. The topic and scope of the work must be arranged with a faculty member in advance; a written paper describing the results of the project is required at its completion (note that a two-term project can be designed such that the grade YC is given after the first term). Senior majors in astronomy or astrophysics wishing to do a senior thesis should make arrangements in May of their junior year and sign up for a total of 6 points over their final two terms. Both a substantial written document and an oral presentation of thesis results are required.

Section	Title	Call Number	Class Type	Day, Time, Location & Instructor	Method of Instruction	Grading Mode	Credits	Enrollment
001	INDEPENDENT RESEARCH	14289	IND. STUDY	 <a href="#">Agueros, Marcel (maa17)</a> >	 In-Person	Standard	3	<div><div></div><div>Blocked 12 / 15</div></div> <div> ^</div>

## Salary/stipend: Need a source of funding

- Can come directly from your advisor's grant (if available)
- Summer programs generally have their own sources of funding

# Opportunities at Columbia

## Finding advisors

- Department tries to connect interested students with opportunities
  - Contact [Frits Paerels](#) (DUS)
- This class will also try to connect you with mentors! Stay tuned :)

## Funding

- Astronomy department has limited scholarships available
- [Columbia Center for Career Education grants](#)
- For Barnard students: [Summer Research Institute \(SRI\)](#)



# My advice

1. Try to do a small research project this summer to build on the skills you're learning in this class
2. Apply to summer programs at least once
3. Try different subfields/methods/topics! (At least 2)
4. Don't take on too many projects at once

**Next week, you'll hear from a panel of Columbia grad students about their undergrad experiences – come prepared with questions!**