



SELECTING A DIVERSE AND BALANCED COHORT

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The REU selection process is an unrecognized bottleneck in the diversity pipeline. Faculty and program managers often lament that there are not enough strong, diverse candidates in the application pool. However, this may reflect biases in the selection process, rather than in the applicants' capabilities or potential. This chapter shares tips and strategies for selecting a diverse cohort of students and provides background information for new PIs.

➔ Student Recruitment Guidelines

The NSF REU program aims to broaden participation among students from underrepresented groups. The Solicitation (20-587) states that:

- » NSF is interested in increasing the numbers of women, underrepresented minorities, and persons with disabilities in research. REU projects are strongly encouraged to involve students who are members of these groups. Underrepresented minorities include African Americans, Hispanics, American Indians, Alaska Natives, Native Hawaiians, and other Pacific Islanders.
- » At least half of the student participants must be recruited from academic institutions where research opportunities in STEM are limited (including two-year colleges).
- » REU projects are encouraged to consider students who are veterans of the U.S. Armed Services and first-generation college students.
- » Undergraduate participants supported with NSF funds must be U.S. citizens, U.S. nationals, or permanent residents of the United States.

Other underrepresented groups in the geosciences: Students from groups not listed in the program solicitation (e.g., those in the LGBTQ+ community, Asian Americans, and low-income students) are also underrepresented in the geosciences. Although there are multiple ways to define underrepresented groups, the key goal is to create diverse, inclusive geoscience research communities.

Students with previous REU experience:

In order to provide experiences to as many students as possible, REU coordinators should confirm with the program director managing that site if they would like to recruit a student who has already participated in an NSF-funded REU Site.



➔ Factors to Consider in Selecting Your Cohort

Target demographics: Remember your proposal's demographic goals. If possible, avoid the "lonely only" - i.e., single student from a particular background.

Institutional diversity: At least half of the students are to be recruited from community colleges or other institutions with limited research opportunities.

Maximum benefit: Strive to select students who might not pursue science without this REU experience; for instance, those who have not had similar prior experiences.

Gender balance: Strive for a gender balance, with a maximum of 60% from any gender.

STEM courses: Check that the student has sufficient STEM coursework and has done adequately in those courses to be able to succeed, bearing in mind that small colleges might not have the specialized courses that larger institutions are able to offer.

Technical skills: Compile a list of necessary skills for each project, and consider whether any of these skills could be taught during the REU. For team projects, students can have different skills, complementing and teaching each other.

Privilege versus financial constraints: e.g., Did the student participate in short international volunteer experiences, or have they worked at service jobs throughout college? Holding a job while in school can demonstrate diligence, perseverance, loyalty, grit, and good time-management skills.

Leadership skills: These may include qualities such as integrity, accountability, communication, passion, empathy, creativity, decision-making, vision, and the ability to inspire others. Applicants' experience, essay questions, and interviews can reveal these traits.

Experience facing adversity and hurdles: Students who have dealt with issues such as poverty, physical disabilities, learning disabilities, or trauma may be more resilient and more compassionate team players.



Champions of diversity: Does the applicant have a track record in broadening participation, such as tutoring underserved students or working in a minority-serving organization? Does their experience suggest that they will be an engaged, supportive member of the cohort?



Institutional Rules on Using Demographic Data in the Selection Process

Rules regarding the use of demographic data when selecting an REU cohort are evolving, both over time and across institutions. Many institutions allow demographic data to be used so that cohorts can be more balanced, e.g., in terms of gender and ethnicity. Some organizations do not permit demographic data to be used in the selection process. Check the rules at your institution.

Check with your program officer whether they would like you to collect demographic information on your students. These data demonstrate whether the REU program is succeeding at recruiting students from underrepresented groups.



➔ Factors to Use With Caution

“In my Ph.D. class the student who was the “smartest” (best test and exam scores) was the only one who did not have a successful research career. He was very smart but not very original in the way that leads to success as a scientist.”

– Doug Duncan, *Astrophysical & Planetary Science Dept., University of Colorado at Boulder*

The favorite, GPA: Going with this easy metric may exclude students who have tremendous potential and who may fall within your target demographics. Research shows students with high GPA do not perform better as researchers. GPA may reflect the amount of time available to study, and therefore privilege.

Extracurricular activities: Participation in sports, organized activities or volunteer trips abroad can show that the student is engaged and has leadership experience. Note that these activities are more accessible to students of

privilege. Those in lower income brackets or with greater family responsibility may not have the financial resources or time to participate.

Letters of Recommendation: Letters of recommendation can provide insight into a candidate's strengths and weaknesses and connect their skills and experiences to job requirements. However, research shows they are rife with bias, with a tendency to favor men over women, Whites over minorities, and applicants from research-intensive institutions over non-research institutions. For example, letters often describe women as helpful, hard-working, pleasant team players, while men are described with standout terms like brilliant, focused, and having strong potential.



A five-year study of 1,000 letters of recommendation for postdoctoral fellowships in the geosciences showed that female applicants were only half as likely to receive “excellent” letters compared to male applicants, for example, describing applicants as having a “thorough understanding of the subject” versus being a “brilliant scientist and role model” or a “trailblazer.” The authors attribute this to implicit (unconscious) gender bias (*Dutt et al., 2016*).

Some GEO REUs are no longer requiring letters of recommendation due to biases inherent in letter-writing, the disproportionate burden placed on faculty at smaller institutions, and the difficulty that students sometimes have in obtaining letters.

➔ How does the process of selecting a cohort work?

While methods of selecting a cohort vary widely across REU sites, all have the goal of identifying candidates who will benefit from the experience, succeed, contribute to the cohort, and potentially fulfill demographic targets in the REU proposal.

Most REU applications will ask applicants about their interests



in scientific topics and techniques, and use these in matching students with projects. Other REU sites post project descriptions online and ask students to rank those projects.

The selection process usually includes the following steps:

1. Identify the needed project skills
2. Work with a small selection committee to do an initial screening of applicants
3. Reduce (or increase) the number of applications
4. Create a list of top candidates
5. Conduct short telephone or video interviews
6. Inform students of the decision

A More Detailed View of the Selection Process

1. Identify the needed project skills:

Talk with mentors about the skills involved in the project and which of those can be taught or modeled.

2. Work with a small selection committee:

Choose two or three colleagues for the selection committee who can share the workload and bring diverse perspectives to the table. Before reviewing applications, the committee members must be:

1. Educated about NSF goals, program goals, implicit bias, and factors to consider in selecting a diverse and balanced cohort.
2. Aware of the skills that are needed for each research project, and whether they are needed by each student or the team as a whole, and whether they can be taught during the REU program.



Meet with the mentors and compile a list of skills that they really need students to have for their project. Press them on this list --is it REALLY necessary for students to come with each skill in place? For example, if coding skills are necessary, can you run a coding workshop for students during the first week of the program, rather than requiring they already have this skill? This supports diversity because then you don't favor students from Research 1 universities that have greater access to a wide variety of skill acquisition."

*- Itchung Cheung, Hatfield Marine Science Center,
Oregon State University*

3. Aware of the selection process and the number of applications the mentors will be able to interview.

Should we provide implicit bias training for reviewers?

Yes. Implicit bias training helps us to see our own tendencies in selecting candidates and improves how people review applications. Such training can be facilitated by diversity professionals in your institution or by external consultants.

What is the role of the mentors in cohort selection?

Mentors are often involved in selecting from a subset of the applicant pool, but in some cases, the selection committee matches students with projects. Some mentors may believe that they should be allowed to select from a large pool of applicants. However, mentors who are not familiar with the program goals or with the biases in certain measures tend to select students with the highest GPA, the most research experience, the strongest letters of recommendation, and those who are the most familiar to them, culturally. This may lead to a cohort that is not balanced or does not align with the REU goals.

3. Reduce (or increase) the number of applications:

Have too few applications from your target demographic group?

- » Ask the GEO REU community via the email listserv to share applications with you.
- » Encourage students with incomplete applications to finish them.
- » Allow late letters of recommendation (or omit the requirement from your process).
- » Set a priority (versus firm) deadline, which allows for a second round of recruiting.



Have a huge number of applications? Do an initial screening using a threshold criterion. For example:



- » **Omit obvious cases:** Students applying to the wrong internship or with incomplete applications.
- » **Academic level:** Be careful using this criterion, as it may eliminate candidates from your target pool.
- » **GPA:** Some programs use a GPA cut-off such as 3.0. Be careful not to eliminate candidates from your target pool (e.g., community college students, first-generation students, or veterans).

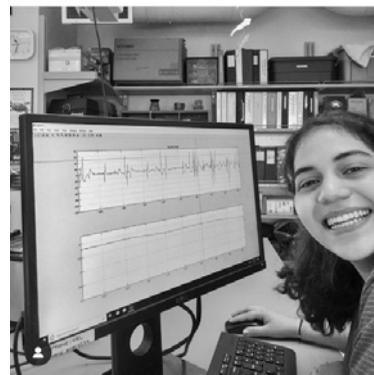
Next: Pare down to the top ~25 – 40 candidates with the help of your selection committee.

Tip: Ensure that each application is reviewed by at least two people for considering the more difficult cases.

4. Create a list of top candidates:

List, for example, the top three students who can be interviewed by the PI and mentor, or select the top ten students overall with backups for interview purposes.

Providing unique accommodations or support: If any student needs special accommodations, they should talk to their NSF program director about support. For additional information on supporting students with physical, learning, or other disabilities, contact the International Association for Geoscience Diversity (IAGD) for recommendations, while realizing that each individual situation can be different. If the student is a primary caretaker, discuss the situation with your NSF Program Officer.



5. Conduct short telephone or video interviews:

It is recommended that the PI interview the top candidates, ideally with the mentor for each project. Ask and answer questions, and then choose which students to accept. Even short 10–15 minute interviews can provide a sense of the students' interests and concerns. Students will cooperate in setting up a time for a call because they are very interested in the job! It is well worth the time.

6. Inform students of the decision

When should we send out acceptance letters? As early as possible, but no later than March 1st. All GEO REU sites must give students until at least March 15th (the Common Acceptance Deadline) to accept their offers. Sending out acceptances by March 1st will give

students at least two weeks to decide. An acceptance form that stipulates some conditions is provided in this chapter's Appendix.

Should we send out rejection letters? Yes. Decline notices for student applications are expected, and are an important part of the process. Do this right away so that they can accept other opportunities. See the sample letters and acceptance form in the Appendix.

Sharing their application with other programs:

For the top candidates who are not given a spot, put a positive spin on their rejection letter by informing them that although they were not selected, the reviewers saw value in their application and would like to forward it to other REU programs for consideration. Contact the GEO REU email list community to share applications.

See the sample letters and acceptance form in the chapter Appendix.

Summary: Dos and Don'ts of the Selection Process

1. Don't hand a pile of applications to your research mentors to choose from. It is your job as PI (or site manager) to manage the selection process.
2. Don't handle the selection process singlehandedly. Form a committee of a few people, and assign at least two reviewers per application.
3. Do ensure your selection process is aligned with your program goals, as stated in your proposal.
4. Do provide training for mentors and others involved in the selection process, including information about program goals, implicit bias, and factors to consider to select a diverse cohort.
5. Do work with mentors to identify skills really needed by students *a priori* versus skills that could be readily acquired during the program (e.g., by providing trainings).
6. Do consider different skill requirements for individual or team-based projects.
7. Do choose students who will benefit the most from the experience, rather than those that have the most experience.
8. Do choose students who show an interest in giving back and being supportive to create a more cohesive cohort.

Take home: Selecting students for an REU program may *seem* like a straightforward process. However, if REU site managers let things unfold without being intentional, the cohort may be neither diverse nor supportive.

Resources

Ways to reduce biases in hiring

<https://biasinterrupters.org/wp-content/uploads/Identifying-Bias-in-Hiring-Worksheet.pdf>

How GPA and GRE scores don't predict student performance in graduate school

<https://www.sciencemag.org/careers/2017/01/student-performance-measures-don-t-perform>

Pathways of unconscious bias

<https://nccc.georgetown.edu/bias/module-1/2.php>



Further Reading

Bernard, R. and E.G.G. Cooperdock. 2018. No progress on diversity in 40 years. *Nature Geoscience*. 11, 292-284. <https://doi.org/10.1038/s41561-018-0116-6>.

Dutt, K. and D.L. Pfaff, F. Bernstein, A.F. J.S. Dillard, C.J. Block. 2016. Gender differences in recommendation letters for postdoctoral fellowships in geoscience. *Nature Geoscience*. 9. 10.1038/ngeo2819. <https://www.nature.com/articles/ngeo2819>.

Emery, N., A. Hund, R. Burks, M. Duffy, C. Scoffoni, and A. Swei. Students as ecologists: Strategies for successful mentorship of undergraduate researchers. *Ecol. Evol.* 2019; 9 : 4316–4326. <https://doi.org/10.1002/ece3.5090>.

Houser, C. & K. Lemmons. 2018. Implicit bias in letters of recommendation for an undergraduate research internship, *Journal of Further and Higher Education*, 42:5, 585-595, DOI: 10.1080/0309877X.2017.1301410.

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- Kuo, M. 2017. Student performance measures that don't perform. Science News. <https://www.sciencemag.org/careers/2017/01/student-performance-measures-don-t-perform>.
- Landrum, R. E., E. B. Jeglum, and J. R. Cashin. 1994. "The Decision-Making Processes of Graduate Admissions Committees in Psychology." Journal of Social Behavior and Personality 9 (2): 239. <https://pdfs.semanticscholar.org/c553/73a1988c482481fda537f2d3b37c39c84265.pdf>.
- Lopez, S., M. Oehlert, and R. Moberly. 1996. Selection Criteria for American Psychological Association-Accredited Internship Programs: A Survey of Training Directors. Professional Psychology: Research and Practice 27: 518–520. <https://pdfs.semanticscholar.org/462f/fc4594b2557125432ee57b560e469bea1a96.pdf>.
- Shen, H. 2013. Mind the Gender Gap. Nature 495: 22–24. <https://usm.maine.edu/sites/default/files/womenadvance/Inequality%20quantified%20Mind%20gender%20gap%20%20Nature%20News%20%26%20Comment.pdf>.
- Zhang, L. 2016. Study reveals implicit gender bias in recommendation letters. The Daily Texan Online. <https://www.dailytexanonline.com/2016/11/02/study-reveals-implicit-gender-bias-in-recommendation-letters>



 Appendix

Sample Letter of Acceptance

February 28, 2021

Dear {Name},

Congratulations! You have been selected as a participant for this summer's {name of} program at the {name of institution}. As an REU intern, you will:

- » Conduct original research under the guidance of a science mentor
- » Prepare a research paper and presentation based on your research
- » Participate professionally in all REU activities

This year's summer program for interns will take place from May 24 to August 5, 2021. The program will provide you with:

- » A stipend or wage of \$xx per hour (or per week/month, etc.) for up to 40 hours a week during the summer internship at {name of institution}
- » Round-trip airfare to {location} from anywhere within the United States (including Puerto Rico)
- » Paid housing accommodations during your summer internship. (Paid housing is taxable income.)
- » A local bus pass

Continuation of employment will be subject to all of {name of institution}'s policies, including satisfactory performance, and subject as well to the availability of funding to support those program activities to which this offer applies.

In the near future, we will be in touch about travel arrangements, housing accommodations, research themes, and mentors.

Please let us know by March 15th, 2021 of your decision by e-mailing {email address} and submitting your signed acceptance contract (also by email), should you choose to accept the position. In the meantime, please feel free to contact us with any questions. We believe the {name of program} is an excellent opportunity for academically talented students like you. We look forward to working with you!

Cordially,

{Signature,
Printed name,
title}

Sample Acceptance of {name of REU} Internship Position

Submission deadline: March 15, 2021

With this, I accept the position as REU intern as offered to me in the included letter. I reviewed the position description and accept its terms. {Name of REU} will provide me with housing in {town/location} for the duration of the internship, and I will adhere to the rules associated with this housing. I understand that, upon receipt of this acceptance letter, {name of REU} will arrange and pay for (or reimburse me for) my travel to/from {location of REU}, from anywhere within the United States and Puerto Rico ("Travel Costs"). If, after sending this acceptance and once {the REU program} books {or pays for} my ticket, I decide not to participate in the program, I will reimburse {REU program} for any and all Travel Costs. [{The Name of REU program} evaluates the reason for cancellation and respects personal or family emergencies].

Sincerely,
{Signature,
Printed name,
title}



Sample Letter of Decline

February 28, 2021

Dear {Name},

I regret to inform you that you were not selected for the {name of program} Research Experiences for Undergraduates Program at the {name of institute}. The response to this summer's program was tremendous and we only had {number, e.g., 10} positions available. The selection committee deliberated extensively before coming to consensus. Many strong candidates had to be turned away simply because we can only support a limited number of students.

If you would like us to share your application with other programs that are still seeking applicants, please let me know.

Other internship opportunities to consider in future include those posted at these sites:

- » NSF Research Experiences for Undergraduates: https://www.nsf.gov/crssprgm/reu/reu_search.jsp
- » NOAA Student Opportunities: <https://www.noaa.gov/education/opportunities/student-opportunities>
- » GSA (Geological Society of American): geosociety.org (see Education and Careers)
- » AMS (American Meteorological Society): ametsoc.org (see Education, jobs)

Please note that if your graduation is December of next year or later, you will be eligible again in the following summer. The application will be posted by December 1st and will be due February 10th.

Thank you for your interest in our program. I sincerely wish you the best in your educational pursuits.

Sincerely,
{Signature,
Printed name,
title}