

Summer opportunities in mathematics

as collected by Thomas Pietraho

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Research experiences in pure and applied mathematics

National Science Foundation's Research Experiences for Undergraduates

Located throughout the country, REUs are eight-to-ten week programs which admit roughly a dozen students each for an intensive experience working on mathematics research closely with a professor. The stipend for the summer is between \$3000 and \$4000. All travel and living expenses are covered.

The programs are highly competitive, targeting mainly students for the summer after their junior year who are exploring the possibility of attending graduate school. Required background usually consists of at least a course in linear algebra and mathematical proof. When researching individual programs, don't be discouraged by intimidating project titles. The programs are designed for students just like you, and you will be taught the background necessary to participate. This is a great opportunity to learn something not ordinarily seen in any class at Bowdoin.

Notes: The application deadlines vary, but cluster around February and March. The programs are quite competitive, so apply broadly. And expect to take some time reading all the listings and following the links, there are many. Don't be afraid to apply before you are a junior, but don't be discouraged if you are not accepted this early in your career.

For more information, visit:

[NSF listings](#)

[AMS listings](#)

This is a three week residential program in Park City, Utah. There are classes and problem sessions at a variety of levels, from undergraduate through research level mathematics. There are concurrent programs for teachers at all levels. The program offers a smaller stipend, and its short length allows students to do some mathematics and spend some of the summer at home or elsewhere. Each summer is focused on one topic, but the topics themselves vary broadly from data science to cryptography to algebra or anything in between.

For more information, visit:

[Park City Mathematics Institute](#)

Programs at research institutes

Much like REUs, the several math research institutes sponsor their own experiences for undergraduates. They are also very competitive, but tend to accept just a few more students:

Research in Industrial Projects: UCLA and Singapore

“The Research in Industrial Projects (RIPS) Program provides an opportunity for high-achieving undergraduate students to work in teams on a real-world research project proposed by a sponsor from industry or a national lab.

“Projects are selected to have a major mathematical component and to be something that will pose an interesting challenge to talented undergraduates. Recent projects have included how to do a physics-based animation of a lava lamp, how to stitch together two images, how to analyze cancer data using microarrays, statistical data assimilation methods for weather data, modeling particle transport phenomena in reactors, and designing missions to the moons of Jupiter. This is just a sampling of the types of projects assigned to RIPS teams. New industrial sponsors join the RIPS Program each year and the same projects are never repeated.”

Notes: This one of the few programs where graduating seniors are eligible to apply. Also, students who are not US citizens are eligible for this program.

Research in Industrial Projects

Programs at research institutes

Summer@ICERM – A special institute at Brown University

ICERM is designed for a select group of about twenty undergraduate scholars. Students work in groups of two to four, supervised by faculty advisors and aided by teaching assistants.

Notes: Funding is available for a very small number of students who are not US citizens or permanent residents.

ICERM

MSRI-UP – Mathematical Sciences Research Institute in Berkeley, CA

The MSRI Undergraduate Program (MSRI-UP) is a comprehensive summer program designed for undergraduate students who have completed two years of university-level mathematics courses and would like to conduct research in the mathematical sciences. The main objective of the MSRI-UP is to identify talented students, especially those from underrepresented groups, who are interested in mathematics and make available to them meaningful research opportunities, the necessary skills and knowledge to participate in successful collaborations, and a community of academic peers and mentors who can advise, encourage and support them through a successful graduate program.

MSRI-UP

Government internships

Government internships

NASA internships

NASA Internships are educational hands-on opportunities that provide unique NASA-related research and operational experiences for high school, undergraduate, and graduate students as well as educators. These internships integrate participants with career professionals emphasizing mentor-directed, degree-related, real-time world task completion. During the internship participants engage in scientific or engineering research, development, and operations activities. In addition, there are non-technical internship opportunities to engage in professional activities which support NASA business and administrative processes. Through these internships, participants leverage NASA's unique mission activities and mentorship to enhance and increase their professional capabilities and clarify their long-term career goals.

DEVELOP and LARSS are popular programs. The location that accepts the most applicants is Langley in Virginia, and some of the more coveted locations are Goddard, Ames, and JPL in D.C. and California. Coding experience is helpful, but not required, for instance experience with one of GIS, Matlab or Python.

Government internships

National Security Agency Programs

The NSA offers programs for undergraduate mathematics and computer science students. The most selective programs require a mathematics background that includes some abstract algebra or number theory.

Note: Applications are due in October, so start early if you are interested.

Other government research laboratories

The American Mathematics Society lists a variety of opportunities for mathematics students in the many government-sponsored research laboratories throughout the United States. Topics vary, but there are a lot of possibilities. And the information is not always fantastically-well organized, so it make take you some time to do research and narrow the possibilities. To start, use the following link and check the “internships” box:

[AMS opportunities](#)

Special programs for women interested in mathematics

Special programs for women interested in mathematics

Institute for Advanced Study at Princeton University

The program brings together research mathematicians with undergraduate and graduate students for an intensive eleven-day workshop on the campus of the Institute for Advanced Study which is designed to address issues of gender imbalance in mathematics. Founded in 1994, the program includes lectures and seminars on a focused mathematical topic, mentoring, discussions on peer relations, an introduction to career opportunities and a women in sciences seminar.

[IAS-WAM](#)

The Edge Program

This program is intended to enhance the diversity of women in mathematics graduate programs. It is intended for women planning to apply to graduate school in mathematics and provides a solid introduction to topics you will see during your first year in graduate school.

[The Edge Program](#)

Programs in statistics

Programs in statistics

Joint Program in Survey Methodology

Paid summer internships sponsored by the Federal Statistical Agencies in Washington, DC. This is a great opportunity to learn about how statistics is used within the US government. A minimum GPA of 3.5 is required, although statistic coursework is not.

The US Census Bureau

The US Census Bureau summer internship program seeks students interested in statistics.

Summer Institute for Training in Biostatistics

"SIBS was designed to provide undergraduate and beginning graduate students with intensive training in applied biostatistical methods and to expose them to graduate school and career options in the fields of biostatistics, statistics, and public health. SIBS is an immersive four-week experience hosted on at a number of institutions. Students take a two-credit hour graduate-level course in introductory applied biostatistical methods, they attend seminars and panel discussions featuring faculty, staff and alumni, and participate in field trips to local public health institutions as well as in numerous social activities."

Notes: There are a number of SIBS sites throughout the country. Historically, this has been a great program for Bowdoin students looking to investigate what a career in biostatistics might look like.

Programs in math biology

Quantitative Research in the Life and Social Sciences Program

This intensive eight-week summer research experience for undergraduates in Tempe, Arizona prepares promising young scientists interested in working at the interface of mathematics, statistics and the natural and social sciences for the rigors of graduate studies. QRLSSP is a research experience for undergraduates; it is not an internship, nor will students earn college credit for participation

Teaching opportunities

Teaching opportunities

Working as a counselor in a summer math program

There are a number of summer math programs for high school and junior high school students who seek undergraduates as counselors or teaching assistants. This can be a fun way to do a little teaching of mathematics and encourage younger students who are interested in math. You can find a comprehensive list at

[AMS opportunities](#)

by selecting the “math camps” box. You may need to contact each one to see whether there is an application for a counselor position.

Gifted and talented summer programs

Gifted and talented summer programs hire college students as teaching and residential assistants. These positions are usually posted in December to January. These include:

[The Center for Talented Youth](#) and [Summer Institute for the Gifted](#).

Teaching and residential assistants

Teaching and residential assistants at summer academic programs are available at many of the large New England boarding schools. Openings for these positions are posted on Bowdoin’s career services site – many have deadlines in December to early January. Schools include Loomis Chaffee, Exeter Academy, and Northfield Mount Hermon.

Summer research at Bowdoin

Summer research at Bowdoin

Students can sometimes conduct summer research with a professor at Bowdoin. If you are interested, initiate a conversation with your professors late in the fall semester or very early in the spring semester. You will probably apply for a [Bowdoin Student Research Award](#). The application deadlines for summer research awards are in early February. For examples of past undergraduate research experiences in the Mathematics Department, see our student [research page](#). Most individual faculty pages have descriptions of their research interests, and some have specific information for students interested in working on research projects.

Practicalities to consider

1. **Letters of reference:** Most likely, you will need a letter of recommendation from a faculty member in the math department. Ideally, ask a month before the deadline and then send a reminder a week before the recommendation is due. If you are early in your career as a math major, make an effort to know your professors and let them know that you are interested in doing some math over the summer. This way, not only will they get to know you and be able to write a more informative letter, but also steer you toward any opportunities of which they become aware.
2. **Apply broadly.** Many of the programs are quite small and receive a large number of applications. Often, our students apply to more than a dozen.
3. **Follow up.** If you spent a summer at one of these programs, debrief your letter writers afterwards. If you did interesting work, participate in Bowdoin's research symposium held each fall.