

**Summer REU and Internship programs, 2021**  
**Annotated List by William Yslas Vélez, December 30, 2020**

Information about summer REU programs is available at the NSF website:

[http://www.nsf.gov/crssprgm/reu/list\\_result.cfm?unitid=5044](http://www.nsf.gov/crssprgm/reu/list_result.cfm?unitid=5044)

The AMS website lists internships with industry and national laboratories. There are many opportunities for holding internships abroad. Mathematics majors should apply for these internships even though many do not list mathematics as an area of interest. Mathematical training, with a modicum of programming and science courses, is a great calling card.

<http://www.ams.org/programs/students/emp-internships>

Notice that there is a summer internship opportunity in Austria, <https://phd.pages.ist.ac.at/isternship/>. However, due to COVID, for 2021 this opportunity is restricted to students located in Europe only.

There are also summer programs in biostatistics. The following website provides information on some of these summer programs (As of late December 2020, this website had not been updated).

<http://www.nhlbi.nih.gov/research/training/summer-institute-biostatistics-t15>

Mathematics majors, who have a background in programming and have taken some biology or chemistry, can be quite competitive for programs in biostatistics.

Many mathematics majors take courses in computer science. Mathematics majors who have a strong background and interest in computer science should also look into summer REU programs that are funded through Computer and Information Science and Engineering at NSF. **For those students who have an interest in data science, machine learning, security issues dealing with communication etc., there are many opportunities at these sites.** In looking through some of the websites, I could not find minimal requirements, except for the ability to program in some language. These programs do not list mathematics as one of the majors that they are interested in but they do state, “or related major”. Some of these sites provide support for international students (like RISS at Cernegie Mellon) Here is a link.

[https://www.nsf.gov/crssprgm/reu/list\\_result.jsp?unitid=5049](https://www.nsf.gov/crssprgm/reu/list_result.jsp?unitid=5049)

The division of Education and Human Resources funds REU programs that focus on STEM education. Here is a link to those programs.

[https://www.nsf.gov/crssprgm/reu/list\\_result.jsp?unitid=10021](https://www.nsf.gov/crssprgm/reu/list_result.jsp?unitid=10021)

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Most of the REU programs in mathematics are for students in their junior year who have completed at least one proof intensive course and at least some upper division course work in algebra, analysis or linear algebra.

I have read over the descriptions of the proposed activities for the REU sites and commented on programs that did not have the above-mentioned prerequisites. In particular, I looked for those programs that students who have not started upper division courses could apply to. Many REU sites do not list the

minimum prerequisites or I may have overlooked some so please look carefully at the REU websites. In cases where I could not determine prerequisites, I did not refer to them.

Most of the summer REU programs require some computing background, so I will not list it separately as a requirement. This computing requirement may consist of either programming skills in some language or facility with some computational package.

### **Some summer programs that do not appear on the NSF website**

1. Brown University, ICERM, Computational Polygonal Billiards (<https://icerm.brown.edu/summerug/>)
2. USC Viterbi (<http://gapp.usc.edu/sure>)

### **Assist High School students**

1. PROMYS (<https://promys.org/home>) This is a program for gifted high school students and math majors can apply to be counselors to work with these high school students. In 2021, this will be a virtual program. There are opportunities for international students.
2. John Hopkins Center for Talented Youth (<https://cty.jhu.edu/jobs/summer>)

### **For students interested in research on mathematics education**

1. Illinois State University: For pre-service mathematics teachers. (<https://about.illinoisstate.edu/reu/>)
2. North Dakota State University (<http://www.ndsu.edu/cider/reu/>). Collaborations in Discipline-Based Education Research. This program will not be offered in 2021.

**For Community College students:** Of course, CC students can apply to any of the programs listed here. However, I found a program that specifically focuses on community college students.

1. Maricopa Community College (<https://math.asu.edu/AM2REU>).

### **For students who have completed two semesters of calculus**

1. Arizona State University (<https://mtbi.asu.edu/SummerProgram>), Mathematical and Theoretical Biology Institute: The site says that students who have completed at least their sophomore year and have completed two semesters of calculus are eligible to apply.
2. Mathematical Staircase, Inc. (<http://www.mathily.org/mathilyest/>) The site says that the program is for exceptional first-year college students.
3. Michigan State University (<https://lbc.msu.edu/about/suriem.html>) Students must be in their early stages of education.
4. Prairie View A& M University (<https://www.pvamu.edu/bcas/reu/>). The site states that college algebra and basic computer programming are required.
5. St. Mary's College of Maryland (<http://faculty.smcm.edu/sganzell/reu/>). The website, as of Dec 30, 2020 has not indicated if the program will run in 2021.

### **For students who have completed multivariable calculus and linear algebra**

1. Ithaca College (<https://www.ithaca.edu/academics/school-humanities-and-sciences/mathematics/nsf-reu-dynamical-systems-ic>)
2. RUSIS@Oregon State University, a summer program in statistics. Contact Dr. Javier Rojo ([jrojo052@gmail.com](mailto:jrojo052@gmail.com)) for an application
- 3.

### **For students who have completed 30 units**

1. Bethune-Cookman University, Mathematical modeling in Environmental, Biological and other Sciences, (<https://www.cookman.edu/academics/schools/CSEM/programs/MMEBS/index.html>). As of Dec. 29, 2020, this website has not been updated for 2021.

### **For students who have completed three semesters of calculus, differential equations, and linear algebra**

1. Maricopa Community College (<https://math.asu.edu/AM2REU>).

For most of these summer REU programs, students do not receive undergraduate college credit. However, for some students, obtaining such credit can be useful. There are a few programs that offer such credit.

### **Programs where students earn undergraduate credit for participating.**

1. Oregon State University ( [http://math.oregonstate.edu/~math\\_reu/](http://math.oregonstate.edu/~math_reu/) ). 12 quarter units of undergraduate credit are awarded.

### **A Summer Program in Puerto Rico**

1. East Tennessee State University will hold its REU in Ponce, Puerto Rico. (<http://www.ipam.ucla.edu/programs/student-research-programs/research-in-industrial-projects-for-students-rips-2021/>)

Programs in Statistics

1. RUSIS@Oregon State University, Contact Dr. Javier Rojo (

### **Industrial Mathematics**

1. Institute for Pure and Applied Mathematics research program in industrial mathematics in Singapore. (<http://www.ipam.ucla.edu/programs/student-research-programs/research-in-industrial-projects-for-students-rips-2021-singapore/>)
2. IPAM (<http://www.ipam.ucla.edu/programs/student-research-programs/research-in-industrial-projects-for-students-rips-2021/>)

3. Worcester Polytechnic University  
([http://labs.wpi.edu/cims/?utm\\_source=redirector&utm\\_medium=cims&utm\\_campaign=short\\_url](http://labs.wpi.edu/cims/?utm_source=redirector&utm_medium=cims&utm_campaign=short_url))

### **International Opportunities or Programs Open to International Students**

Several programs now state that international students may apply, though no funding is available for them since NSF restricts funding to U.S. citizens and permanent residents. International students who have the funds to enroll in summer classes at their undergraduate institutions might instead use those funds to participate in a summer research program. Some of the following programs allow international students to self-fund their participation or have funding available for a limited number for international students.

1. DIMACS (<http://dimacs.rutgers.edu/REU/>). A small number of the participants will spend the last two weeks in DIMATIA in Prague.
2. IPAM (<http://www.ipam.ucla.edu/programs/student-research-programs/research-in-industrial-projects-for-students-rips-2021-singapore/>)
3. University of Minnesota, Minneapolis (<http://www.math.umn.edu/~reiner/REU/REU.html>). Recently we have been able to provide some funding for international students. Cold Spring Harbor Laboratory ( <https://www.cshl.edu/education/undergraduate-research-program/>). Of course a background in the biological sciences is required. Students of any nationality are eligible for the program.
4. ICERM at Brown University Brown University, ICERM ( <https://icerm.brown.edu/summerug/> ) . Funding is available for a limited number of students who are not US citizens or permanent residents.
5. John Hopkins Center for Talented Youth has programs in other countries.  
([http://cty.jhu.edu/jobs/summer/sites\\_dates.html](http://cty.jhu.edu/jobs/summer/sites_dates.html))
6. Williams College ( <https://math.williams.edu/small/> )

### **Some REU programs in Mathematics and the Biological Sciences**

1. Summer Program in Biostatistics & Computational Biology at the Harvard T.H. Chan School of Public Health (<https://www.hsph.harvard.edu/biostatistics/diversity/summer-program/>)
2. Indiana University-Purdue University Indianapolis (<http://math.iupui.edu/reu>).
3. Ohio State University (<https://mbi.osu.edu/education/summer-undergraduate-program/>).
4. University of Wisconsin-La Crosse (<https://www.uwlax.edu/mathematics/activities/reu/>).
5. Cold Spring Harbor Laboratory ( <https://www.cshl.edu/education/undergraduate-research-program/>). Of course a background in the biological sciences is required.
6. Dordt College ( <https://www.dordt.edu/academics/research-and-scholarship/undergraduate-summerresearch/statistical-genetics-and-biostatistics> ).
7. University of Pittsburgh, School of Medicine (<http://www.tecbioreu.pitt.edu/>).
8. Harvard Medical School, Program in Systems Biology (<https://sysbio.med.harvard.edu/summer-internships>)

### **Programs with a focus on under-represented students**

Many of the summer research programs indicate that they strongly encourage minority and female students to apply. The following programs specifically target minority students.

1. Committee on Institutional Cooperation (<https://www.btaa.org/resources-for/students/srop/introduction>)
2. MSRI-UP (<http://www.msri.org/web/msri/education/for-undergraduates/msri-up>)

### **Programs where graduates can apply**

1. Park City Mathematics Institute, (<https://www.ias.edu/pcmi>). As of Dec 30, 2020, the website had not indicated the topic for the 2021 summer school.
2. Institute for Pure and Applied Mathematics research program in industrial mathematics in Singapore. (<http://www.ipam.ucla.edu/programs/student-research-programs/research-in-industrial-projects-for-students-rips-2021-singapore/>)
3. IPAM (<http://www.ipam.ucla.edu/programs/student-research-programs/research-in-industrial-projects-for-students-rips-2021/>)
4. US Department of Energy (<https://science.osti.gov/wdts/suli>)
5. Department of Homeland Security (<https://orise.orau.gov/internships-fellowships/undergraduates.html>)

Many of the national labs have internship programs. These internship programs can be for the summer or for a semester. As examples look at the following.

### **National labs and Government Agencies that may not appear on the AMS website**

1. Lincoln Laboratory, MIT ( <https://www.ll.mit.edu/careers/student-opportunities/summer-researchprogram> )
2. US Department of Energy (<https://science.osti.gov/wdts/suli>)
3. EERE National Storage Internship Program (<https://zintellect.com/Opportunity/Details/DOE-EERE-EnergyStorage-2021>)

**Data Science** is a growing field where mathematically prepared students can apply. The following link has internship opportunities in statistics and data science for both undergraduates and graduate students.

<https://stattrak.amstat.org/2019/12/01/2020-internship-listings/>