

**Summer REU and Internship programs, 2020**  
**Annotated List by William Yslas Vélez, December 17, 2019**

Information about summer REU programs are 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/>

There are also summer programs in biostatistics. The following website provides information on some of these summer programs( As of late December 2019, 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”. 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, Fast Learning Algorithms for Numerical Computation and Data Analysis (<https://icerm.brown.edu/summerug/2020/>)
2. USC Viterbi (<http://gapp.usc.edu/sure>)

### **Assist High School students**

1. PROMYS (<http://promys.org/counselors>). This is a program for gifted high school students and math majors can apply to be counselors to work with these high school students.
2. John Hopkins Center for Talented Youth (<http://cty.jhu.edu/jobs/summer/positions/index.html>).

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

1. North Dakota State University (<http://www.ndsu.edu/cider/reu/>). Collaborations in Discipline-Based Education Research.

**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. Michigan State University (<http://www.lymanbriggs.msu.edu/SURIEM/>). Students must be in their early stages of education.
3. MathILY-EST ( <http://www.msri.org/web/msri/education/for-undergraduates/msri-up>). The website actually states it is for students who have completed the first year of college.
4. St. Mary's College of Maryland (<http://faculty.smc.edu/sganzell/reu/>).
5. Rose Hulman (<https://www.rose-hulman.edu/mathREU/>). One of the PIs, Tarrant, contacted me and said that his project requires two semester of calculus.

### **For students who have completed two semesters of calculus and linear algebra**

1. Grand Valley State University (<http://www.gvsu.edu/mathreu/>)

### **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>

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

1. Texas A&M (<http://www.math.tamu.edu/undergraduate/research/REU/>) The website was not active as of December 2019.
2. 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. Boise State (<http://math.boisestate.edu/reu/>). Three units of undergraduate credit are awarded.
2. 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.

### **Statistics**

1. Oregon State University. For applications contact Dr. Javier Rojo ([jrojo052@gmail.com](mailto:jrojo052@gmail.com))
2. University of North Carolina Wilmington (<https://www.uncw.edu/math/reu/>) Statistical Data mining and Machine Learning.

### **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-2020-singapore/>)
2. IPAM <http://www.ipam.ucla.edu/programs/student-research-programs/research-in-industrial-projects-for-students-rips-2020/>)
3. Worcester Polytechnic University <http://labs.wpi.edu/cims/initiatives/reu/> )

### **Program for students who are deaf or hard-of-hearing.**

1. Rochester Institute of Technology (<https://people.rit.edu/bcjntm/REU.html>). This award supports a summer undergraduate research experience program that is geared toward the needs of deaf and

hard-of-hearing scholars. The site will be based at National Technical Institute for the Deaf (NTID) at Rochester Institute of Technology.

### **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. Clemson University (<https://www.math.clemson.edu/ccnt/undergraduate/reu/>) Funding is restricted to US citizens or permanent residents. In the past we have had international students fund themselves and we will again consider such applications.
2. DIMACS (<http://dimacs.rutgers.edu/REU/>). A small number of the participants will spend the last two weeks in DIMATIA in Prague.
3. IPAM (<http://www.ipam.ucla.edu/programs/student-research-programs/research-in-industrial-projects-for-students-rips-2020/>)
4. 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.
5. 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.
6. 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))
7. Williams College (<https://math.williams.edu/small/>)
8. Georgia Tech (<https://math.gatech.edu/undergraduate-summer-research-program>). The website was not active in December 2019.

### **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/about-the-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 Connecticut Health Center (<https://health.uconn.edu/quantitative-medicine/biomath/>) . The website was not active in December 2019.
5. University of Wisconsin-La Crosse (<https://www.uwlax.edu/mathematics/activities/reu/>).
6. Cold Spring Harbor Laboratory (<https://www.cshl.edu/education/undergraduate-research-program/>). Of course a background in the biological sciences is required.

7. Dordt College ( <https://www.dordt.edu/academics/research-and-scholarship/undergraduate-summerresearch/statistical-genetics-and-biostatistics> ).
8. University of Pittsburgh, School of Medicine (<http://www.tecbioreu.pitt.edu/>). National Institute for Mathematical and Biological Synthesis (<http://www.nimbios.org/sre/>).

### **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 (<http://www.cic.net/Home/Students/SROP/Home.aspx>)
2. MSRI-UP <http://www.msri.org/web/msri/education/for-undergraduates/msri-up>)

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

1. Park City Mathematics Institute, Topic: Number Theory Informed by Computation. <https://www.ias.edu/pcmi/uss2020>).
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-2020/>)
3. IPAM <http://www.ipam.ucla.edu/programs/student-research-programs/research-in-industrial-projects-for-students-rips-2020/>)
4. US Department of Energy (<https://science.osti.gov/wdts/suli>)

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. National Institute for Mathematical Biological Synthesis (<http://www.nimbios.org/sre/>)