

# REU, PURA, URSA, Undergraduate Research What You Should Know

October 2016

## 1 REU - Paid Summer Research

### 1.1 Overview

- REU = “Research Experience for Undergraduates”
- In short, paid undergraduate research that lasts between 9–12 weeks of the summer.
- Mostly funded by the NSF (National Science Foundation), in various subjects such as mathematics, physics, chemistry, etc.
- Undergraduate students supported with NSF funds must be citizens or permanent residents of the United States or its possessions.
- Several schools have their own source of funding in order to allow international students to participate in undergraduate research.
- Designed to simulate the graduate school research experience.
- Can be very competitive (more well-known REUs such as SMALL received more than 500 applications each year, for only 46 spots in the 2016 intake)
- Many REU-typed programs are not listed under REU on the AMS website. However, it is a good place to start (<http://www.ams.org/programs/students/emp-reu>)

### 1.2 Applications FAQs

#### 1. How do I know that I am qualified?

Due to funding, one of the most important things to look for first is whether or not your citizenship/permanent resident status will pose a problem. Check to see if you qualify for the program. After this is clarified, here is a list of question you might want to ask yourself in order. Note that there is not a standard requirement for GPA or courses completed. Some things to consider:

- Do you have a GPA  $\geq 3.0$ ?
- Have you taken Foundation of Mathematical Proof and done well?
- Are you at least a second-year?
- Have you taken Combinatorics (MATH3012) and/or Probability and Statistics (MATH 3215)?
- Have you taken Real Analysis (MATH 4317) and/or Abstract Algebra (MATH 4107)?

Most programs prefer applicants who are at least in their second year of the degree. This is so that they can be sure of the applicants’ mathematical background as well as maturity. Due to the duration of these programs, a lot choose their topics from the fields of combinatorics and probstats as they are more accessible. The last item is not strictly necessary but can be advantageous for your application as they allow you to incorporate techniques from these fields to whatever your research topic may be.

#### 2. Do I have to be a math major to apply?

Though most mathematics REUs might look upon mathematics majors more favorably, one *DOES NOT* have to be a mathematics major. In these cases, you might want to put some time into your personal statement in order to explain in details how the REU can play an important part in your studies.

#### 3. How do I choose where to apply?

There are more than 100 REUs listed so it can be difficult to choose where to apply.

<https://www.nsf.gov/crssprgm/reu/index.jsp> Applying to between 8 - 12 programs across the countries as each of these locations can give you a slightly different experience. Former REU recipient: Do not be afraid to apply to places that you think you might not enjoy the location much. You will spend so much time doing research that it will not matter so much and even if it does, you will only be there for a couple

of months. This might even help you decide where you want to apply for grad schools.

You will also want to look at the topics on which particular REUs are focused. Often, even if there is not yet any announcement on the coming year's topics, you can deduce what the REUs might do based on their past years. In addition, you might want to consider whether an REU is a good match for you based on the combination of courses that you have taken so far.

#### 4. **I am an international student. What programs can I apply to?**

Although most REUs are funded by the NSF, thus funding is not available to international students, there are many that have their own source of funding as well as programs that are not classified as REUs. For example, you can take a look at: SMALL REU at Williams College, UMinn Duluth REU, CERN Open Lab (yes, this is the CERN in Switzerland), Rutgers DIMACS REU, Brown University ICERM REU, UCLA RIPS, etc.

If you have other plans for the summer and/or do not want to stay in the US for that long of a period of time, there are workshops and short courses held at several institutions that you can apply to attend.

#### 5. **What application material do I need to prepare?**

- Online Application (usually online at MathPrograms.org)
- Transcript (unofficial copy often suffices)
- Resume/CV
- 2 recommendation letters - preferably from Math professors  
DO NOT ASK YOUR PROFESSORS FOR LETTERS LAST MINUTE!!! You want to give them at least a month to write a good letter. It is recommended that you talk to each of the professors whom you think will be appropriate recommendation letter writers in person, giving your CV and unofficial transcript so they have some understanding of you. Then send them (the recommenders) a list of programs to which you are applying (in deadline order).
- Personal Statement (usually the limit is 2 pages)  
Take some serious time to write your personal statement. Tell a story - even if it is about you resisting the joy of math only to realize later that you enjoy it and change your major half-way through college. Such storylines make reading your application less of a task to the organizers and make you a more interesting person.

#### 6. **General Advice**

- DO start application early - October is not too early to prepare for an application that is due February
- DO email the organizers if you have questions
- DO apply to a wide variety of locations.
- DO mention what your field of interest is in your personal statement.
- DON'T give your recommendation providers just one week of notice.
- DON'T accept more than one offer.
- DO ask for more time if you cannot make up your mind yet.
- Once you start receiving offers, DO email places from which you have not heard back yet to ask about your status or let them know that you have accepted a position elsewhere.

### 1.3 **Extra Tips for International Students**

#### 1. **Work Authorization**

As an international student doing paid summer research, you are considered to be working during your vacation time and thus needs a work authorization. Most REU programs cannot help you with obtaining work permit and also often expect that by the time you receive the offer, you already have a work permit or can obtain one in a short period of time. There are two types of work authorization: Optional Practical Training (OPT) and Curricular Practical Training (CPT). They both require that you work at a position related to your major and that the working time fits into a particular time frame but they have very different application processes:

- OPT: Application must be processed by the OIE (Office of International Education) first and then submitted to the Department of Homeland Security. You do not need to have an offer letter to apply for one of these and once accepted, a work permit will be mailed to you. However, the processing time is more than 90 days and each OPT application may cost about \$380.

- CPT: This type of authorization is free and can be obtained through working with C2D2 (Center for Career Discovery and Development) and OIE. However, this is only available if you are working between 10 and 12 weeks of the summer and you can only apply for one after you have gotten an offer letter. The processing time is about 2 weeks. Contact OIE for details.

In either cases, you will want to work very closely with your career advisor in C2D2 and the OIE to successfully obtain the authorization. **DO NOT WORK WITHOUT AUTHORIZATION - THIS CAN TERMINATE YOUR F1/J1 STATUS.**

## 2. Social Security Number (SSN)

In order to work, you will also need to have a SSN. The application is pretty straightforward and can be found online but again, you need to have an offer letter from your employer in order to apply. Contact OIE and/or C2D2 for details.

## 3. Planning Your Summer

You are encouraged to plan your summer travel ahead of time. International tickets are expensive and international travel can be very tiring so you will not want to do things last minute. In addition, coming back to the US right before your REU starts can mean that you are not in your right state of mind the first week of the program.

### 1.4 Expectations

#### 1. What you can expect?

- Living with fellow participants in the same dorm
- Research advisor(s) who will assign readings (even before you arrive) and can help with graduate school conversations
- Special topic seminars
- Ethics training(s)
- Graduate school panel
- Possible presentations and poster sessions at the end of program as well as at conferences.

#### 2. What is expect of you?

- Hard work
- Stamina
- Enthusiasm
- Responsibility
- Team work

## 2 PURA and URSA - Research Options on Campus

### 2.1 Undergraduate Research at Tech

- As a math major, you have the option to do undergraduate research for up to 6 credit hours with a GT professor (usually a Math). Usually, students sign up for 3 hours. These credit hours can go to your math electives requirement (Applied Math) or your senior project requirement (Discrete Math).
- Once you have a clear idea of what the research project is about and there is a direction you want to pursue, you can talk to your research advisor and apply for either PURA/URSA which will both provide you up to \$1500 a semester to do research.

### 2.2 Differences between PURA and URSA

1. PURA is a campus-wide award that is separated into salary award and travel award. If you are doing research on campus then you will be applying for the stipend award. If you already have significant result and are going to present at conferences then you can apply for the travel award. You can only apply for the award once per academic year. The application includes two major components:
  - Research Project Proposal
  - Letter of Recommendation

The guidelines to these items can be found at <http://urop.gatech.edu/pura-salary>. Once you are offered the award and decide to take it, you will be required to work with the administration of the school to fill out employment paperwork and to complete the online ethics trainings. At the end of the semester, you will be required to submit a 2-page final report and 2-minute video of the student talking about what the student achieved in the semester in terms of the project. Students must register for the free tuition audit course MATH 2698/4698 during the semester of their PURA award. After the student is offered the award and decides to take it, the student sends a message to [academics@math.gatech.edu](mailto:academics@math.gatech.edu) requesting a permit for MATH 2698/4698. Include GTID and the name of the research advisor.

2. URSA is the College of Science research salary award. Information about URSA can be found at <http://cosinfo.gatech.edu/ursa>. You can also only apply for this once per academic year but your award might be extended for extra semesters based on your progress. Again, the application will also include a research project proposal and the email of your research advisor. You will also be required to submit a final report at the end of the semester.

### 3. Related Items

- Students can earn a BS in Applied Mathematics with Research Option or a BS in Discrete Mathematics with Research Option (appears on transcript). MATH 2698/4698 can apply to the requirements for the Research Option. For information about the Research Option see <http://www.math.gatech.edu/academics/undergraduate/research-option-applied-or-discrete-mathematics>.
- Conference Travel Grants for College of Sciences' Undergraduate Students (NEW!). Georgia Tech undergraduates, currently enrolled in a B.S. degree program in the College of Sciences and who have been accepted to give an oral or poster presentation on their Georgia Tech research at a professional conference, are encouraged to apply for conference travel funding. Website: <http://cosinfo.gatech.edu/cosuctg>