



Center for Energy Efficient Electronics Science

2018 Summer Research Program

Research Information & Application Packet

Please note ONLY ONLINE APPLICATIONS WILL BE ACCEPTED. This application is being provided so that you can prepare and draft your responses before submitting them online.

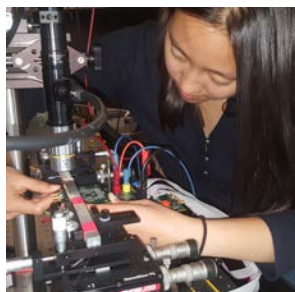


Program funded by



**E³S Research Experiences for Undergraduates
2018 Summer Research Program**

Testimonials and advice from students who have participated in E³S REU Program:



I learned this summer exactly what it would be like as a graduate student in a materials science laboratory. I was able to work on my public speaking / presentation skills every week which I found extremely valuable.

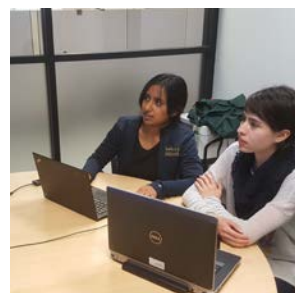


I found synthetic lab work extremely rewarding. Thanks to the summer, I have decided to apply to chemistry graduate programs and seek work in synthetic / materials chemistry. Further, this summer solidified UC Berkeley as my top choice for graduate school.



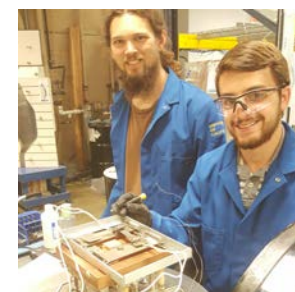
I learned a lot and gained an interest in a specific research field. I also made some amazing life-long friends

I wholeheartedly recommend this program. I guess my only advice would be to think hard and work hard while you're here. Don't waste the great opportunity.



This program exceeded my expectations. I learned so much more than I thought I would about research, graduate admissions, and electrical engineering. I especially feel much more confident with my ability to write a technical paper.

I was more independent than I thought I would be, and I really enjoyed that



The enrichment activities and seminars during the program were extremely useful. I enjoyed the seminar/ technical talks and felt that they were a good starting point for finding out more about other energy efficient related research outside of my lab. The talks about graduate admissions, networking, and NSF fellowships are very, very useful and related to my academic goals. I think they've given me an advantage in my process for applying to graduate school I've learned I have the ability to survive graduate school

I learned that when I enjoy doing something it doesn't seem like work.

E³S Research Experiences for Undergraduates
2018 Summer Research Program

About the Center for Energy Efficient Electronics Science:



The Center for Energy Efficient Electronics Science (E³S) is a multidisciplinary science and technology center funded by the National Science Foundation. The mission of E³S is to make fundamental and conceptual breakthroughs in the underlying physics, chemistry, and materials science of electronic systems to reduce energy consumption in electronic devices. E³S has research topics in nanoelectronics, nanomechanics, nanophotonics and nanomagnetism. The Center is multi-institutional with faculty, students, and postdocs conducting research at FIU, MIT, Stanford, UC Berkeley, and UT at El Paso.

⌘ All Interested Eligible Students, especially underrepresented students (minorities, women, veterans, and persons with disabilities) are Strongly Encouraged to Apply ⌘

Online Applications, Transcripts, Resumes, & Recommendation Letters
must be received by Friday, January 26, 2018

I. Program Eligibility

College students who

- Are sophomores, juniors, and non-graduating seniors enrolled in four year colleges and universities in the United States
- Majoring in engineering or physical science
- Are United States citizens, nationals, or permanent residents
- Have a 3.25 GPA or higher

Note: No prior research experience is required. In fact, we especially encourage applications from eligible students who have not conducted research.

II. Program Basics

- Spend nine weeks pursuing independent research *full-time* on a topic related to your major under the one-to-one mentorship of a FIU, MIT, Stanford, UC Berkeley, or UTEP faculty member.
 - Attend Research Orientation to prepare you for your work
 - Receive on-going support from your faculty mentor and research program staff to successfully complete your work
 - At the end of the summer you will deliver an oral PowerPoint and Poster presentation on your research in a closing symposium and submit a 2-page report of your work
 - Receive a Certificate of Program Completion
- Receive either housing or a housing stipend on the FIU, MIT, Stanford, UC Berkeley, or UT at El Paso campus. The program will also cover transportation costs to and from the host institution (up to \$600). Depending on the campus, you may also receive free meals.
- Receive a summer stipend of \$4,000.

E³S Research Experiences for Undergraduates

2018 Summer Research Program

- Meet and share your experience with research students like yourself from universities across the country including through planned social events.
- Attend seminars on preparing for science and engineering careers and applying to graduate school.

III. Program Benefits

- You will be able to truly familiarize yourself with issues related to your prospective major with the world-class faculty and resources on campus.
- You will be able to speak from authority and experience about your interest in your major for your graduate school application.
- You will develop research skills and abilities that will impress graduate admissions committees, faculty and departments.
- Assuming you do well, you will gain a faculty advocate who can attest to your abilities for graduate school.

IV. Dates

- The REU will run from June 9th - August 11th.

V. Frequently Asked Questions

Do I need research experience to apply? No! We strongly encourage you to apply regardless of past research experience, especially if you are an underrepresented student in science and engineering (underrepresented minorities, women, veterans, and persons with a disability). One of the goals of this program is to give research experience to students who would not otherwise be able to at their university.

Who should I ask for my letters of recommendation? Recommendations should be from faculty members and mentors. It's important for you to know what a weak letter of recommendation is: a weak letter is one that says you are a good student and nothing else. A strong letter of recommendation will be: this student is great, and then it should go into detail about why the recommender believes that you are so good based off of your previous interactions. Be sure to let your recommenders know that faculty and graduate students review the applications, so that they can gear their letter towards that audience.

I have more than one area of interest, should I include them all? Yes. Provide as much information as you can to aid E³S in the selection process. It is also best to be as specific as possible in order to appropriately match you with a faculty mentor.

I am an international student; can I apply to the E³S REU program? No. Unfortunately, we cannot accept international students for our research programs as we are funded by the National Science Foundation, a federal agency, which allows us to only fund US citizens, nationals, & permanent residents.

I am planning to graduate in Spring 2018; can I apply to the E³S REU program? No. All students must be planning to return to a college or university as an undergraduate in the fall after participating in the E³S REU program.

Is this program available for graduate students? No. The E³S REU is only available to undergraduate students.

E³S Research Experiences for Undergraduates

2018 Summer Research Program

What majors will be considered? Physical science and engineering majors, including but not limited to: chemical engineering, chemistry, electrical engineering, materials science, and physics.

What research topics are available? Research projects in energy efficient electronics are available at: <http://www.e3s-center.org/research/index.htm> Most of the research projects are based at UC Berkeley; however, positions are available at all five schools.

What topics have past summer interns researched? See Past Projects on E³S REU website: <http://www.e3s-center.org/education/edu-reu-2016-projects.htm>

Who reads the essays? Faculty, graduate students, and post-docs (all members of the science and engineering community) will be reviewing your essays. The people reviewing your essay may or may not have a degree in your field so it's good to write for a broader audience. Also, it's good to remember that the people reading your application all have a technical background and it is very important to go into detail about your technical interests. The essays should be written to give the reviewers a greater understanding of your academic, personal, and professional qualifications to participate in the E³S summer research program.

I attend FIU, MIT, Stanford, UC Berkeley, or UT at El Paso, can I apply to the E³S REU Program? Yes, you can apply; however, you may not do research at your home institution (for example UC Berkeley students can only do research at FIU, MIT, Stanford, or UT at El Paso).

How do I apply? Only ONLINE applications will be accepted. Transcripts, resume, and recommendation letters may be emailed, faxed, or mailed to the REU program office.

How long before the deadline should things be mailed? All application materials must be RECEIVED by January 27, 2018. Mail delivery typically will take 5-6 days to reach our offices from across the country, but it can be longer. Please mail your materials far enough in advance to ensure that they are received on-time.

Where do I send my transcripts and resume? *By mail:* E³S REU Program, ATTN: Dr. Kedrick Perry, Diversity Director, University of California, 562 Sutardja Dai Hall, Berkeley, CA 94720-1764. *By fax:* (510) 664-4113. *By email:* kbperry@berkeley.edu.

Can I send in an unofficial transcript? Yes, unofficial transcripts will be accepted. If admitted, you will be expected to provide an official copy of your transcript.

How will I know when my application is complete? We are unable to let you know when your application is complete before the deadline, and it is therefore your responsibility to ensure all documents will reach our office on time. If you email in your documents, you will receive an email notification that it has been received. If your documents are faxed or mailed, we will be unable to let you know that we've received them until after the application deadline. All students will be emailed after the deadline to let them know if their application is complete or not.

What is the application deadline? Applications are due: January 26, 11:59 P.M. PST. Applications are accepted from early-October until January 26, 2018. It is to your advantage to submit your application early to ensure all requirements arrive in time.

When are the applications reviewed? Complete applications will be reviewed as they are turned in. The earlier an application is submitted, the earlier it will be reviewed. There are a very high number of applications received in the last days before the deadline, therefore it is to the advantage of the student to turn in their application well in advance to ensure all materials are received on time.

E³S Research Experiences for Undergraduates

2018 Summer Research Program

How are research mentors chosen? Students are matched to a research mentor who does research in the area of the student's interest. On your application, identify E³S faculty members whose research interests you. If admitted into the program, the admissions committee does its best to place interns in one of their top choice, or in the closest area of research.

How are research projects chosen? Projects are chosen for the students based on the interests they list on their applications. We try to match the student's interests to a project that a mentor has for the summer. These projects change yearly and are dependent upon the mentor's needs. If chosen to be a part of a project, the mentee and mentor will work out between them what the project will entail.

How is placement decided? We try to match you with your top institution and projects. Most of the research projects are based at UC Berkeley; however, positions are available at all five schools. When you apply to E³S REU program, you may be assigned an internship at FIU, MIT, Stanford, UC Berkeley, or UTEP.

When will I find out if I am accepted into the program? Students are notified of their acceptance into the program by mid-March.

How long do I have to accept an offer? Once you are notified of admission into E³S REU, you have one week to accept.

How long does E³S REU Program run? E³S REU is a nine week program. In 2018 it will run from June 9th – August 11th. Students are expected to participate for the entire duration of the program.

What if my final exams conflict with the program dates? Students are required to participate for the entire duration of the program. If your final exams conflict with the program start date, you should arrange to take your exams earlier.

Can I take classes while participating in E³S REU? No. E³S REU interns cannot take classes while participating in the program because it will negatively affect their research. Interns are expected to spend the majority of their time (40 hours/week) in lab as well as completing their E³S REU deliverables.

If accepted into E³S REU at a specific institute (FIU, MIT, Stanford, UC Berkeley, or UTEP), does that guarantee admission as a graduate student? No. All E³S REU interns have an opportunity to interact with a number of E³S faculty, administrators, and students. However, acceptance into E³S REU does NOT guarantee admission into any graduate schools.

Can I bring a car? No. Parking is limited on campus and there is no campus overnight parking.

Is it possible for me to live at home while I do research? If accepted into the MIT or UC Berkeley program you will be required to live in the dorms on campus as these are both residential programs. There is no such requirement for Stanford, FIU or UTEP.

Other questions? Please Dr. Kedrick Perry at kbperry@berkeley.edu or (510) 664-4467.

VI. How to Apply?

Application Requirements

- Completed online application form- **only ONLINE applications will be accepted.**

E³S Research Experiences for Undergraduates
2018 Summer Research Program

- Two recommendations from current faculty, mentors, or supervisors in science or engineering
- Unofficial or official academic transcript from all universities attended
- Resume

To apply to the E³S REU program, follow these steps:

Step 1.

Attach your transcripts, resume, and emails of your recommenders onto the online application form. Download or print the Letter of Recommendation Form. Provide your recommenders the form and in the online application, there is a designated section where you put the emails of your recommenders. They will receive an email from Submittable with instructions to submit your letter of recommendation. Please inform them of this process so they will be aware of and also remind them to whitelist Submittable in their emails to prevent it from being spammed.

All applications and letters of recommendations must be received by January 26, 2018. Late and incomplete applications will not be reviewed. Decisions should be emailed by March 31st.

Application, transcript(s), resume, and letters of recommendations must be received by January 26, 2018. Late and incomplete applications will not be reviewed. Decisions should be emailed by mid-March.

Questions and supporting documents can be addressed to:

E³S REU Program
ATTN: Dr. Kedrick Perry, Diversity Director
University of California
562 Sutardja Dai Hall
Berkeley, CA 94720-1764
Fax: (510) 664-4113
Email: kbperry@berkeley.edu
Phone: (510) 664-4467

Step 2.

Complete the on-line application <https://e3s.submittable.com/submit/95890/2018-e3s-summer-research-experience-for-undergraduates>

Please note ONLY ONLINE APPLICATIONS SUBMITTED THROUGH SUBMITTABLE WILL. BE ACCEPTED. This application is being provided so that you can prepare and draft your responses before submitting them online.

Instructions: (Please Read)

- ALL applicants should complete sections I -VII and submit transcript(s). (Unofficial transcripts are acceptable)
- Tips for a Successful Application:
 - Be confident that we are eager to read your application; our questions are there to help us get to know you better, not to make you stumble.
 - Carefully Read and Follow all instructions. Read through the entire application once before filling it out.

E³S Research Experiences for Undergraduates
2018 Summer Research Program

- Make sure you save plenty of time to complete the application -- to research what you want to study or research, and in terms of your essay(s) think about what you want to write and then write and revise. All essays should be written/revise at least 2 times and shown to mentors and/or faculty advisors that you trust.
- Double-check to make sure you have followed all instructions and completed all the Required Sections and provided all the requested documents. Incomplete applications will not be reviewed.
- Answer all questions honestly.

✂

I. Personal Information

Name: _____
Last First

Address: _____
Street City State Zip

Email Address: _____ Birthday: _____
Month Day Year

Cell Phone: _____ Alternate Phone: _____

II. Demographic Information: Why is this information being requested? Collection of this information is authorized by the NSF Act of 1950, as amended, 42 U.S.C. 1861, et seq. Demographic data allows NSF to gauge whether our programs and other opportunities in science and technology are fairly reaching and benefiting everyone regardless of demographic category; to ensure that those in under-represented groups have the same knowledge of and access to programs and other research and educational opportunities; and to assess involvement of international investigators in work supported by NSF (E³S National Science Foundation Cooperative Agreement No. 0939514).

Citizenship Status: U.S. Citizen ☐; U.S. Permanent Resident ☐; Other ☐ (Specify) _____

Gender: Male ☐; Female ☐

Ethnicity: Are you of Hispanic, Latino, Chicano, or Spanish origin? Yes ☐ No ☐

Race (*Check all that apply*): African American or Black ☐

Asian (e.g., Asian Indians, Chinese, Filipino, Japanese, Korean, Vietnamese, other Asian) ☐

Caucasian or White ☐

American Indian, Native American or Alaska Native ☐

Native Hawaiian or Other Pacific Islander (e.g., Guamanian, Chamorro, Samoan) ☐

Other ☐ (Specify) _____

Disability: Yes ☐; No ☐; If yes, please specify: _____

Veteran: Yes ☐; No ☐; If yes, please specify branch and dates served: _____

Highest Education Level of Mother/Parent-Guardian I: Less than High School ☐; High School/GED ☐;
Some College ☐; AA/AS ☐; BA/BS ☐; Graduate School ☐

Highest Education Level of Father/Parent-Guardian II: Less than High School ☐; High School/GED ☐;
Some College ☐; AA/AS ☐; BA/BS ☐; Graduate School ☐

E³S Research Experiences for Undergraduates
2018 Summer Research Program

III. Education Background

Undergraduate Institution: _____ Major: _____

Cumulative G.P.A.: _____ Major GPA: _____

Current Academic Level: _____ Anticipated graduation date: _____

Highest Degree Objective: _____

List any educational and/or non-educational honors, awards, scholarships, prizes you have received:

Are you currently receiving, or have you recently received a Pell grant? Yes ☐ No ☐

Are you a member of one of the following programs: LSAMP, McNair, STARS, or MARC?

Yes ☐ No ☐ If yes, please specify: _____

IV. Personal and Academic Experience (all sections are required)

A. Research Interests

Have you participated in other research programs? ☐ Yes ☐ No

If yes, please provide the name(s) of the programs and the institutions that sponsored them:

Please visit the E³S website and indicate which faculty members you would be interested in working with:

<http://www.e3s-center.org/about/about-res.htm>

- | | |
|----------------------------------------------------------------|------------------------------------------------------------|
| <input type="checkbox"/> Elad Alon (UC Berkeley) | <input type="checkbox"/> Jeffrey H. Lang (MIT) |
| <input type="checkbox"/> Dimitri Antoniadis (MIT) | <input type="checkbox"/> Sayeef Salahuddin (UC Berkeley) |
| <input type="checkbox"/> Jeffrey Bokor (UC Berkeley) | <input type="checkbox"/> Vladimir Stojanovic (UC Berkeley) |
| <input type="checkbox"/> Vladimir Bulovic (MIT) | <input type="checkbox"/> Timothy M. Swager (MIT) |
| <input type="checkbox"/> Constance Chang-Hasnain (UC Berkeley) | <input type="checkbox"/> H.-S. Philip Wong (Stanford) |
| <input type="checkbox"/> Jesus A. del Alamo (MIT) | <input type="checkbox"/> Junqiao Wu (UC Berkeley) |
| <input type="checkbox"/> Eugene A. Fitzgerald (MIT) | <input type="checkbox"/> Ming C. Wu (UC Berkeley) |
| <input type="checkbox"/> Steven Louie | <input type="checkbox"/> Eli Yablonovitch (UC Berkeley) |
| <input type="checkbox"/> Ali Javey (UC Berkeley) | <input type="checkbox"/> David Zubia (UTEP) |
| <input type="checkbox"/> Sakhrat Khizroev (FIU) | <input type="checkbox"/> Felix Fischer (UC Berkeley) |
| <input type="checkbox"/> Tsu-Jae King Liu (UC Berkeley) | <input type="checkbox"/> Jing Kong (MIT) |

Please explain why you have chosen these faculty. (Maximum 100 words)

E³S has summer intern positions available at FIU, MIT, Stanford, UC Berkeley, and UT at El Paso. Please rank the following locations from the most preferable (1) to the least preferable (5).

FIU: _____

UC Berkeley: _____

MIT: _____

UT at El Paso: _____

Stanford: _____

E³S Research Experiences for Undergraduates
2018 Summer Research Program

B. Essays

- 1) Express why you want to participate in this program and indicate your particular area of interest in energy efficient electronics science (Maximum 500 words)
- 2) Describe on prior research or professional experience. If no prior experience, please indicate (Maximum 500 words)
- 3) Describe your reasons for wishing to undertake graduate study at the doctoral level and your career goals. In addition, please identify the contributions you wish to make to your chosen field of study as well as your community. (Maximum 500 words)
- 4) If you have performed less than satisfactory in any of your classes, please explain the circumstances. If this does not apply to you, please indicate. (Maximum 500 words)

V. Letter of Recommendations

Two letters of recommendation are required. Complete the Letter of Recommendation Forms (pages 12 and 13) and inform your recommenders that their letters must be **RECEIVED** by Friday January 26, 2018, 11:59, PST. They may send their recommendations via email, fax or regular mail to the address listed on the Form.

List below the names and contact information of your recommenders whom you will contact for a letter of recommendation.

- | | | | |
|----|------|----------|---------------|
| 1. | | | |
| | Name | Position | email Address |
| 2. | | | |
| | Name | Position | email Address |

VI. Program Expectations

1. The Research program will take place for 9 weeks from June 9th to August 11th. Students accepted into the program will be expected to conduct research full-time, by this we mean a minimum of 40 hours per week.

Are there any dates from June 9th to August 11th when you are not available? Yes ☐ No☐. If yes, please list and explain why this absolutely cannot be avoided.

2. Are you able and willing to devote a minimum of 40 hours per week on your research project? Yes ☐ No☐.

3. Research Program participants cannot work or be enrolled in courses, including online courses, unless there are extenuating circumstances. Do you plan to work or enroll in courses while you are in the Research program? Yes ☐ No☐. If yes, please explain the circumstances that require you to do this and how you will still be able to devote yourself to intensive research full-time.

4. All research participants are expected on to live on the host institution campus in provided housing during the entire summer program, including weekends, unless there are extenuating circumstances and you receive prior permission. Can you live on the host institution campus for the entire program? Yes ☐ No☐. If no, please explain.

E³S Research Experiences for Undergraduates
2018 Summer Research Program

5. Are you applying to any other summer programs? Yes ☐ No ☐. If yes, please list these programs and when you will find out about these opportunities. What program is your first choice?

6. I understand that as part of the application process applicants may need to speak/meet with prospective faculty mentors and/or Summer Research Program staff. Yes ☐ No ☐

How did you learn about the E³S Summer Research Program? _____

E³S is one of 14 Science and Technology Centers (STC) throughout the country. Some of these centers have similar fields of research as E³S, and most offer Summer Research Programs. If your application is not selected for the E³S center, would you like to be considered for a REU position at another STC? Yes ☐ No ☐

VII. Statement of Verification (to be read and signed by all applicants)

I hereby certify to the best of my knowledge that all information submitted on this application and in the attached required documents including essay(s) is accurate, complete and my own work. I also certify that the Transcript(s) accurately reflects my grades.

I understand that if I knowingly provide incorrect information, I will, if accepted, be immediately removed from the Summer Research Program (as applicable) and required to reimburse all costs of services provided to me.

Signature _____ Date _____

IS YOUR APPLICATION COMPLETE?

1. Have you submitted the following application material?

- A. Online application ☐
- B. Provided your recommenders the letter of recommendation form and informed your recommenders that their letters are due by Friday, January 26, 2018 ☐

2. Have you emailed, faxed, or mailed the following required documents?

- A. Transcripts from all universities you have attended ☐
- B. Resumes ☐

Completed Applications with required documents must be received by our office on or before January 26, 2018:

E³S Education & Outreach Programs
ATTN: Dr. Kedrick Perry, Diversity Director
University of California
562 Sutardja Dai Hall
Berkeley, CA 94720-1764
Fax: (510) 664-4113
Email: kbperry@berkeley.edu
Phone: (510) 664-4467