



GUIDING OUTSTANDING LEARNERS  
TO DISCOVER (GOLD):

# Summer Youth Intensive Program 2020

REMOTE COACHING &  
4-WEEK LABORATORY INTERNSHIP



Image: K

## About SYIP

SYIP is intended for the most accomplished high school students who are passionate about learning and doing scientific research in chemistry, biochemical chemistry, material science, physics, or related fields, and who are focused on maximizing their future success in college.

Selected students are paired with an assigned mentor in a faculty research group. The mentor provides 9 months of remote coaching beginning October 2019. Students learn about the mentor's current research, strategies, and aims in preparation for a 4-week on-site internship in the assigned mentor's research laboratory beginning July 2020.

During the 4-week internship, students shadow their assigned mentor to assist with data analysis and non-hazardous laboratory procedures, and attend seminars and group meetings. Students will get an in-depth view into concept development, methods design, decision making, scientific processes, and inner workings of world-renowned laboratories that develop advanced technologies and solutions to society's issues.



Image: Elena Zhukova



## SYIP is unlike any other summer program!

**BROUGHT TO YOU BY THE TOP RANKED CHEMISTRY PROGRAM IN THE WORLD.**

SYIP is administered and delivered by the College of Chemistry at UC Berkeley and is led by globally recognized and highly influential faculty. The College's Department of Chemistry is ranked NUMBER ONE in the world!

**OBSERVE AND EXPERIENCE CUTTING-EDGE RESEARCH.**

SYIP teaches students to think for themselves, learn to apply theory, communicate effectively, work in a team, and hone skills that set a UC Berkeley student apart from the others. Students are afforded a unique opportunity to interact with UC Berkeley professors and students while learning about cutting-edge research that is currently being done on campus. Students participate, observe, and experience the workings of world-class research laboratories through on-site internships.

**PROVIDES INVALUABLE INSIGHT INTO THE COLLEGE APPLICATION PROCESS AND COLLEGE LIFE.**

During the 4-week onsite experience, students stay in UC Berkeley dormitories, are chaperoned by UC Berkeley undergraduate students, and receive learning opportunities outside of the laboratory. Students visit Lawrence Berkeley National Laboratory, gain insight about the college application process from the UC Berkeley Admissions Office, and engage in discussions with UC Berkeley undergraduates and faculty mentors.

**CONTINUOUS INTERACTION WITH BERKELEY PROFESSORS AND STUDENTS.**

SYIP provides multiple opportunities for students to interact with and learn from distinguished scientists over the course of a year. This continuous interaction will better inform UC Berkeley professors and mentors when writing recommendation letters.

## Participating Faculty



### PAUL ALIVISATOS

*Nanoscience, nanotechnology, and materials science*

Research concerns the structural, thermodynamic, optical, and electrical properties of colloidal inorganic nanocrystals. The lab investigates the fundamental physical and chemical properties of nanocrystals and also works to develop practical applications of these new materials in biomedicine and renewable energy.

### KWABENA BEDIAKO

*Inorganic materials chemistry, electrochemistry, low-dimensional materials, quantum transport, optoelectronics*

Research efforts involve the mesoscopic investigation of interfacial charge transfer and charge transport in two-dimensional (2D) materials and heterostructures. The design of materials with modular interfaces that can be controlled at atomically precise length scales to study and overcome contemporary challenges in electrochemical energy conversion and quantum electronics are emphasized.

### FRANCIS HELLMAN

*Condensed matter physics and material science*

The group studies thermodynamic and temperature-dependent properties of materials. A series of experiments based on MEMS "lab-on-a-chip" devices utilizing a silicon nitride membrane as a thermal isolation platform have been developed, allowing the ability to study orders of magnitude smaller sample sizes such as Nanoparticles and tiny crystals.

### MARKITA LANDRY

*Nanomaterials, single-molecule fluorescence microscopy, biophysics*

Research lies at the intersection of single-molecule biophysics and nanomaterial-polymer science to develop new tools to probe and characterize complex biological systems.

## Participating Faculty



### LISA PRUITT

*Tissue biomechanics, biomaterial science, fatigue and fracture micromechanisms, orthopedic polymers for total joint replacement, cardiovascular biomaterials, synthetic cartilage, acrylic bone cements, tribology of diamond and DLCs*

Professor Pruitt's research is focused on the structure-property relationships of load bearing medical grade polymers and biological materials. Current projects include the characterization of fatigue fracture mechanisms and tribological performance of orthopedic polymers.

### CLAY RADKE

*Surface and colloid science technology*

Research focuses on using modern spectroscopic tools to combine principles of surface and colloid science towards engineering technologies where phase boundaries dictate system behavior.

### RICHMOND SARPONG

*Organic and organometallic chemistry*

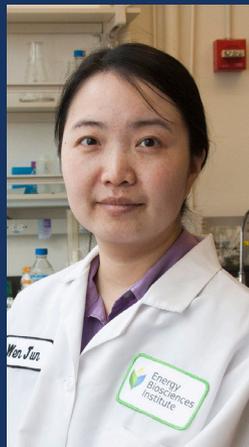
The lab develops total synthesis of biologically active and architecturally complex natural products as a platform for the development of new synthetic methods and strategies. The compounds that are synthesized may ultimately become important tools to study biological systems or provide a starting point for the development of therapeutics.

### DEAN TOSTE

*Organic and organometallic chemistry*

Organic and organometallic chemistry are employed in the development of new synthetic methods, enantioselective catalysts and strategies for the synthesis of natural products. Research is primarily aimed towards the development of catalysts and catalytic reactions and methods for organic synthesis.

# Participating Faculty



## FENG WANG

*Ultra-fast nano-optics*

The lab is interested in light-matter interaction in condensed matter physics, with an emphasis on novel physical phenomena emerging in nanoscale structures and at surfaces/interfaces. When electrons and phonons are confined in nanometer scale or at surface/interfaces, they respond differently to external stimuli. They investigate the unique nature and dynamics of such excited states using advanced laser spectroscopy techniques. Current projects include studying graphene optics, optical spectroscopy of individual nanotubes, plasmonics, and spectroscopy of oxide surfaces/interfaces.

## KE XU

*Biophysical chemistry, nanoscale cell biology, graphene microscopy and chemistry*

Research is to develop new experimental tools to interrogate biological, chemical, and materials systems at the nanoscale with extraordinary resolution, sensitivity, and functionality. To achieve this, the group takes an interdisciplinary, multidimensional approach that integrates advanced microscopy, spectroscopy, cell biology, and nanotechnology.

## TING XU

*Polymers, biomaterials, materials chemistry*

Professor Xu's group focuses on a fundamental understanding of the physics of assemblage on multiple length scales leading to the design and assembly of functional thin films with tailored functionalities and characterization of de novo designed peptides.

## WENJUN ZHANG

*Biomolecular engineering and bioenergy*

Research includes genome mining for new bioactive small molecule discovery, pathway enzyme identification and characterization, as well as pathway designs toward combinatorial natural product biosynthesis and biofuel production.

# Remote Coaching and Laboratory Internship

## 9-MONTH REMOTE COACHING:

OCTOBER 2019 THROUGH JULY 2020

Selected students will be matched to a laboratory that fits their interests as well as the laboratory's needs and preferences based upon the student's demonstrated qualifications and maturity. Each student will be paired with a mentor from the laboratory. The mentor will communicate with the student once or twice per month remotely through email and/or live chat. The student and mentor will work together to determine the best method and frequency for communicating. The objective of the remote coaching will be to provide the student with continuous learning, as well as an understanding and familiarity with the laboratory's research and more advanced scientific concepts in preparation for the 4-week Internship.

## 4-WEEK ON-SITE INTERNSHIP

JULY 12 TO AUGUST 8, 2020

During the 4-week internship in the assigned faculty research group, the student will attend group meetings, research seminars, assist with data analysis and simple, non-hazardous procedures under the supervision of his/her mentor. The student will get an in-depth view into concept development, methods design, decision making, scientific processes, and inner workings of world-renowned laboratories that develop advanced technologies and solutions to society's issues.

At the conclusion of their internship, the students will present their findings to their peers and mentors. Students who successfully complete the Remote Coaching and Internship will be provided reference letters and a completion certificate.





## Student Experiences



**JENNIFER GRANNEN**

SYIP introduced me to the beauty of research and chemical engineering through the scope of grad school. Because of this program, I am now planning on pursuing a PhD in the future! I feel so lucky to have participated in such a unique program!

*UC Berkeley Chemical Engineering Class of 2022*



**DANIEL LEE**

SYIP was the most fun I've had any summer, and it's pretty amazing to see Professor John Arnold, who taught one of the classes, now as the Undergraduate Dean of the College of Chemistry!

*UC Berkeley Chemistry Class of 2022*



**FRANCESCA STEPANOV**

The SYIP program was the most amazing 2 months of my summer. I established amazing connections to peers who were also interested in chemistry and with my mentor who pushed me to understand scientific concepts on a more advanced level. I believe that the SYIP experience has been a catalyst for my love for chemistry as well as research science.

*UC Berkeley College of Natural Resources Class of 2023*



## Eligibility

Rising students entering grades 9-12 are encouraged to apply and participate in the program. Successful applicants will be among the top 10% of their respective class and must demonstrate fluency in English. Applicants must be available for a remote or in-person interview to be considered for the program.

## Program Details

SYIP will take place on the historic UC Berkeley campus every summer.

There is a non-refundable application fee of \$75. This fee will be applied towards the total tuition and fees of US \$14,500 if you are accepted. Tuition includes room and board, course materials, UC Berkeley “swag”, excursions, access to facilities, and official completion certificates signed by the dean of the College.

We will be accepting applications until all slots are filled. SYIP has the capacity for 30 qualified scholars to join.

**Click [here](#) to apply!**



## Contact Us

For questions about the **Summer Youth Intensive Program 2020**, please contact us:

**Gold Programs**

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Or visit our website at:

**[chemistry.berkeley.edu/gold/syip](https://chemistry.berkeley.edu/gold/syip)**



