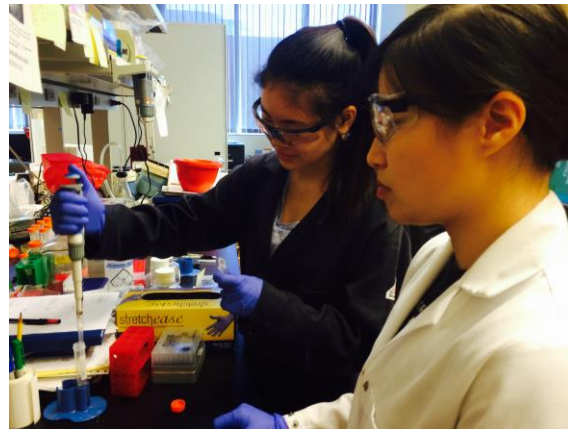




SHINE is a unique 7-week opportunity for high school students on an ambitious STEM research track. SHINE students receive close mentorship from USC Viterbi faculty, graduate student researchers, and visiting national scholars. As part of a research team, they conduct experiments and/or create computer models, & as a cohort, they develop skills in researching scientific literature & presenting their research results in a final poster session.



Fee \$4,750 for 7 weeks includes 1-to-1 mentorship for 20 hrs/wk + much more, details on Web

SHINE runs: June 19 – August 4, 2017

SHINE is designed for rising sophomore - senior students who seek an immersive summer research experience. Applicants select from a wide range of projects (see back of this flyer). A GPA of 3.4 is required. SHINE students receive 1-to-1 mentorship in the lab at least 20 hours/week (+ option for more hours), enjoy Friday cohort lunches with additional mentors, and receive a certificate of completion from their research professor for college applications. Non-residential (no option for living on campus). On our Website, see videos of parent testimonials and SHINE students talking about their hands-on research projects, then check out the final posters & video of poster session.

Viterbipk12.usc.edu/SHINE

Info Session: 2/25
@ USC's EngX festival
Meet SHINE alumni

Applications now being accepted on a rolling basis

Details on Website, or contact Dr. Katie Mills vast@usc.edu

Choose an 2017 Engineering Research Team @ USC SHINE

Aerospace Engineering:

1. Help develop a low-cost Digital Particle Image Velocimetry (DPIV) system for measuring flow in a water channel, using high-speed photography, lasers, computer-based image analysis & 3D-printed objects.
2. Contribute to bio-inspired aerospace research on autonomous flying vehicles with very small wing spans (30 cm) that can fly through doors and window. Their many uses and complex aerodynamics make this an exciting research field.

Biomedical Engineering Options:

1. Our interdisciplinary research group uses custom biomaterials, microfabrication techniques, and cultured cells to engineer miniature human tissues, known as "Organs on Chips," to study human diseases & test new drug platforms.
2. SHINE student will assist in designing and synthesizing nanoparticles and biomaterials to target a specific disease, characterizing the material properties and testing their therapeutic or diagnostic potential using diseased cells.
3. The lab creates biologically inspired in vitro platforms, creating microfabricated models of tumors and bone marrow, to capture the scale of cell signaling from subcellular to tissue levels, discovering novel therapies for human diseases.

Chemical Engineering: We research one of the most important cancer-causing proteins in the human genome, using recombinant DNA technology to generate new antibody mimetic proteins that recognize Ras mutants.

Civil Engineering Options:

1. We focus on understanding the impact of complex human-building interactions on energy consumption, and develop novel methods for detecting/modeling user preferences/patterns (e.g., personalized thermal comfort preferences).
2. We develop ultra-high strength concretes used in exciting new engineering applications such as super tall structures, e.g., the Burj Dubai & the world's tallest building now under construction, Jeddah Tower (aka Kingdom Tower).

Cybersecurity/Information Sciences: Our research investigates a new way to authenticate users by showing them a rapid series of images, some familiar some not, and registering an "intentional blink." At the Marina Del Rey campus.

Electrical Engineering Options:

1. We research neural networks that recognize images or musical melodies using programming languages, e.g., Matlab.
2. We test and analyze novel devices based on emerging nanomaterials for mimicking neuron activities. The multi-disciplinary research project is a cutting-edge integration of electronic devices, circuits and materials science.
3. Students will work to fabricate, characterize and model electronic and photonic devices for next-generation high-performance computing and telecommunication systems.
4. We are working on a color reflective display technology (imaging a color version of the Kindle ebook reader, not the Kindle Fire). The project will focus on building the setup and testing the color modulation mechanism.

Environmental Engineering Options:

1. Our research tackles immense societal challenges -- water shortage, energy sustainability, and climate change -- through environmental engineering applications for resource recovery (water, energy, nutrients) from waste streams.
2. Our SHINE project focuses on using 3D printed materials for clean water applications taking advantage of cutting-edge 3D printing technology to design better water membrane systems for high antifouling efficiency.
3. To meet the challenges of water scarcity, this SHINE project will investigate emerging membrane technologies for water treatment applications in desalination and wastewater reuse.
4. The SHINE project will explore the use of engineered systems as a means to reduce the energy demands and environmental impacts associated with desalination.

Industrial & Systems Engineering Options:

1. 3D Printing of cementitious materials with terrestrial and planetary applications.
2. We study the use of autonomous drones to deliver packages to houses. This project will use a famous theorem from geometric probability theory plus some field work to attempt to calculate improvement.

Material Sciences: We research novel electrical, thermal, optical, & electrochemical properties of emergent complex semiconductor materials, e.g., oxides & chalcogenides, thermoelectrics, photovoltaics, photoelectrochem splitting, etc.

Robotics Options:

1. We develop socially assistive robots aimed at helping people through social rather than physical interaction; our robots are tested with children with autism, stroke patients, Alzheimer's patients, healthy elderly, etc.
2. In the Computational Learning and Motor Control lab, we research human motor learning in robots, finding ways to incorporate sensory information and create algorithms that enable robots to react to their environment.

Advanced Video Game Development: (This is option is a different format, focused on team research & group mentorship at the Gamepipe Lab: only offered if six qualified students apply) Research video game development and procedural content creation through machine learning; make several tower defense levels by hand with our custom TD code, and then conduct collaborative team to study those levels & have the code create unique new ones.