THE SUMMER SCIENCE PROGRAM



The educational experience of a lifetime...since 1959.

The Summer Science Program (SSP) is a nonprofit offering an immersion experience in experimental science to rising high school seniors. Working in teams of three on a college campus, participants complete a hands-on research project. The design incorporates values of collaboration and connection, rigor and challenge, trust and respect, inclusivity and support – exactly what high-potential teens need at this critical life stage, just before they apply to college. The experience accelerates their social and intellectual development, inspiring them to higher confidence and bigger dreams.

One of the oldest pre-college enrichment programs, SSP is uniquely alumni-governed, operated, and supported. Hundreds of alumni are prominent scientists, engineers, doctors, educators, and other professionals. Many cite their SSP summer long ago as life-changing, and continue to support the nonprofit as volunteers and donors.

Each program includes twelve research teams of three participants each, led by seven dedicated, full-time faculty members. Each team is assigned a target of study, acquires and analyzes data, draws conclusions, and writes a final report. Working together continuously for 39 days, they bond as a living-and-learning community.

Admission

Admission is open to high school juniors from around the world. Applicants are evaluated through a holistic, need-blind process, admitting those excelling in the most challenging STEM courses available to them, and showing evidence of motivation to overcome obstacles. SSP meets all demonstrated need with financial aid grants – funded by alumni donations – and shapes each cohort to be diverse in multiple dimensions, including half young women. They each arrive with great potential; the experience leads them to "realize" their potential in both senses of the word: to understand it, and to make it happen.

Community

These teens find collaborative research to be a welcome contrast to competitive high school coursework. They are surprised to discover that being surrounded by equally bright and interesting peers is as rewarding socially as it is intellectually. The spirit of cooperation is reinforced by an



Honor Code and an absence of exams, grades, or formal credit; their rewards are the personal growth they experience, and the worldwide network of peers and alumni they join at summer's end.

Faculty

The faculty includes two PhD-level scientist-educators and a Site Director. Four upperclass college or graduate students serve as Teaching Assistants and Residential Mentors, available 24/7, integrating academic and residential/social roles; many are alumni themselves.



Research

Applicants choose a field of science: currently Astrophysics, Biochemistry, or Genomics. Each program is hosted by a university partner. We continuously seek and evaluate new host campuses and suitable research projects; an Open Call document is available on request. The topics taught are integral to the research project, presented at roughly a third-year college course level, but at a faster pace.

Astrophysics

Biochemistry

Each team takes a series of observations of a near-earth asteroid, then applies vector calculus to predict its future path.

Astronomy: celestial coordinates, digital observational techniques, image reduction, astrometry; Physics: gravitation, celestial mechanics; Mathematics: coordinate transformations, differential and integral vector calculus, numerical methods; Scientific Programming in Python Each team models an enzyme from a fungal crop pathogen, then designs an inhibitor that could be used in a safe fungicide.

Biochemistry: protein purification, enzyme assays, kinetics, and inhibition; **Molecular Modeling**: homology modeling, ligand docking, molecular dynamics, inhibitor optimization; **Bioinformatics**: rate equations, biostatistics; sequence similarity searching, multiple sequence alignment

Genomics

Each team builds a bioreactor to stimulate evolution of antibiotic resistance in E. coli, then analyzes its DNA for mutations.

Genetics: evolution, plasmids, bacterial growth dynamics, antibiotic resistance; Engineering: design process, Raspberry Pi computer, CAD and 3-D printing; Bioengineering: engineering and purification of DNA, PCR; Scientific Programming in Python

Schedule

Participants stay very busy learning, working ... and having fun in the process.

Each program includes a Guest Lecture Series, in which scientists and professionals present on topics not directly related to the research, followed by openended interactions.

Rounding out the dense schedule are behind-the-scenes visits to scientific institutions, recreational excursions, and organized social events, including many longstanding traditions including a talent show.



from participant exit surveys

The Summer Science Program is an independent 501(c)3 nonprofit, operated and governed by its alumni, in cooperation with host campuses: New Mexico Tech, Univ. of Colorado, Purdue Univ., and Indiana Univ., and affiliates: Harvey Mudd College, Caltech, and MIT. Visit <u>SummerScience.org</u> for complete information.