The Summer Science Program (SSP) is one of the longest-running pre-college, research-based enrichment programs for highly gifted high school participants. Applicants choose a project in **Astrophysics** at New Mexico Inst. of Technology or Univ. of Colorado Boulder, or in **Biochemistry** at Purdue Univ. Enrollment at each campus is limited to 36, mostly rising high school seniors from around the U.S. and the world. For complete information, visit summerscience.org.

Design and Goals

The Program's goal is to accelerate the development and raise the aspirations of its participants. Applicants are evaluated through a holistic process very similar to that of highly selective colleges. We admit roughly 10% of applicants, those excelling in the most challenging math & science courses available to them, and showing evidence of maturity and motivation, especially in the face of obstacles. These young people arrive with great potential; SSP inspires them to "realize" that potential in both senses of the word.

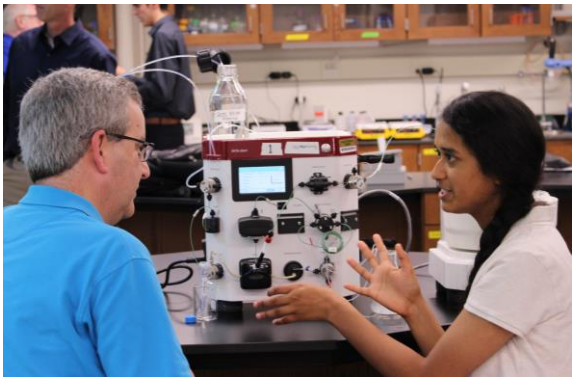
Participants do authentic hands-on research themselves from start to finish, working in teams of three. In the Astrophysics project, each team takes a series of images of a near-earth asteroid, then uses those to calculate its orbit and predict its future position. Teams in the Biochemistry project isolate and model an enzyme from a specific fungal crop pathogen, then design an inhibitor molecule that could become the active ingredient of a safe fungicide.

Participants find collaborative research to be a refreshing and motivating contrast to the competitive, individualized coursework of high school. Many are surprised to discover that being surrounded by equally bright and interesting peers is as rewarding socially as it is intellectually. Indeed, cultivating a supportive community of scholars is another primary goal of SSP. The spirit of cooperation and collaboration is reinforced by an Honor Code and an absence of exams, grades, or formal credit; the experience itself is the reward.

Inspired by this intense, 39-day immersion in a scientific community, most SSP alumni choose STEM majors at leading colleges and universities. Many have gone on to become leaders in their chosen professions, and cite the Program as "the educational experience of a lifetime."

Faculty

The senior faculty on each campus includes two PhD-level scientist / educators and a Site Director. Four Teaching Assistants and Residential Mentors, as the title implies, integrate academic and residential/social roles. Graduate or upper-class college students majoring in a related field, many are alumni returning to SSP. This integration allows mentoring and collaboration to continue during all waking hours.



A participant explains the Biochemistry project to a visiting SSP Trustee

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Material Covered

SSP is not coursework; most of the material presented in the classroom, and reinforced with regular assignments, is taught because it is integral to the research. Topics overlap parts of several courses and are presented at a college sophomore/junior pace and level. Participants keep a scientific notebook and write a final report. They are encouraged to collaborate on homework, as long as what they submit reflects their own understanding.

Topics covered typically include:

Astrophysics Project

Astronomy: celestial coordinates, digital observational techniques, astrometry; brief introductions to planetary science, cosmology

Physics: gravitation, celestial mechanics; brief introductions to the electromagnetic spectrum, relativity, quantum mechanics

Mathematics: interpolation, coordinate transformations, differential and integral vector calculus, numerical methods, differential equations

Scientific Programming in Python

Biochemistry Project

Biochemistry: protein purification, gel electrophoresis, enzyme assays, kinetics, and inhibition, drug screening

Molecular Modeling: homology modeling, ligand docking, molecular dynamics simulations, inhibitor optimization

Mathematics: rate equations, linear and non-linear curve fitting, biostatistics

Bioinformatics: Sequence similarity searching, multiple sequence alignment, secondary structure and binding motif prediction

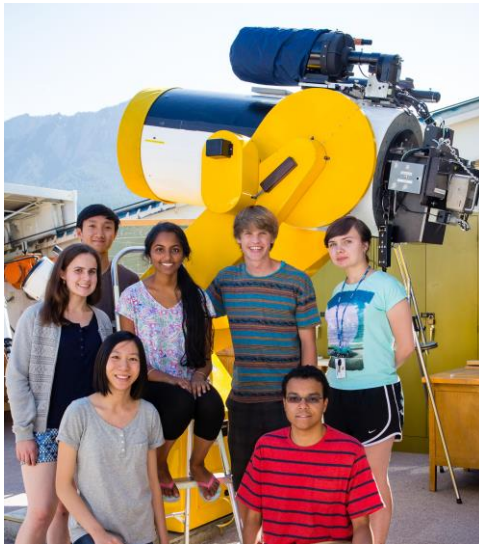
Beyond the Research

About once a week, a guest scientist or professional makes a presentation not directly related to the research, followed by questions and open-ended discussions, and often a shared meal.

Rounding out the packed 39-day schedule are behind-the-scenes visits to scientific institutions, recreational excursions, and organized social events including games / sports, movie night, and a talent show.

Daily Routine

Participants stay very busy. On days when there is no field trip or guest speaker, they spend most waking hours either learning in the classroom or on data collection, analysis, and assignments. Some time is available for exercise and other social activities.



Participants with the 18" telescope at Univ. of Colorado Boulder

SSP is operated by an independent 501(c)3 nonprofit, operated and governed by its own alumni, in cooperation with Harvey Mudd College, Caltech, MIT, and its site partners: New Mexico Tech, University of Colorado, and Purdue University.