Program Description

The Summer Science Program (SSP) is one of the oldest and most successful summer enrichment programs for academically gifted high school students. SSP takes place at two college campuses: New Mexico Tech in Socorro, NM, and Westmont College in Santa Barbara, CA. Enrollment at each campus is limited to 36 students, mostly rising seniors from around the U.S. and the world, chosen through an admissions process very similar to that of selective colleges. For complete information, including prerequisites and application instructions, visit www.summerscience.org.

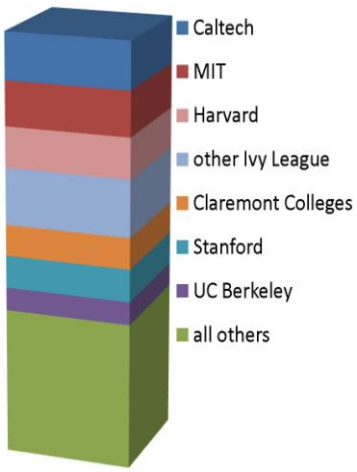
Design and Goals

The Program's primary goal is to accelerate the development and raise the aspirations of the most promising students, who are excelling in the most challenging math & science courses offered to them, and showing extra-curricular evidence of motivation and love of learning. These students arrive with great potential; SSP inspires them to realize that potential.

The curriculum is organized around a classic research project in astronomy: observation of an asteroid and prediction of its orbit around the sun. By day, students learn the astronomy, calculus, physics, computer programming, and methodologies of experimental science they need to perform the project. By night, working in teams of three, they make a series of telescopic observations, measure them precisely, and write the software necessary to fit their observations to an orbit. Their observations are submitted to the Minor Planet Center at the Harvard-Smithsonian Center for Astrophysics.

Students find SSP's unified curriculum, and refreshing emphasis on teamwork rather than competition, to be both challenging and motivating. They are often surprised to discover that being surrounded by equally bright and interesting peers and mentors is as rewarding socially as it is intellectually. Indeed, fostering a supportive social atmosphere is a primary goal of the program. The spirit of cooperation is reinforced by an absence of exams, grades, or formal credit; the learning experience itself is the reward.

Inspired by this college-like experience, most SSP alumni enroll at highly selective colleges and universities (see chart). Over the years many go on to become leaders in their chosen professions, and cite the Program as "the educational experience of a lifetime". Visit the website to read comments from hundreds of alumni about what SSP has meant to them.



Faculty

The faculty on each campus consists of two lecturing faculty (PhD scientists or educators), a Site Director, and four Teaching Assistants (graduate or upper-class college students majoring in a STEM field). Some faculty are themselves SSP alumni. They live on campus in close contact with the students, enabling an informal exchange of ideas and almost continuous availability. Mentoring happens at the telescopes, in the computer lab, at meals, and during the free periods in the evening and on weekends.

Lectures

SSP is not coursework, so the curriculum overlaps parts of several traditional courses. Lectures are designed to develop an understanding of experimental science in general and the orbit determination problem in particular. There are approximately 130 hours of regular lectures, balanced about evenly between mathematics, physics, astronomy, and programming. Material is presented at a college sophomore/junior pace and level. Regular homework assignments reinforce the material. Students are encouraged to collaborate on homework, as long as what they submit reflects their own understanding.

Topics covered in lectures vary somewhat from year to year but typically include:

Astronomy

celestial coordinate systems, digital observational techniques and image reduction, astrometry, asteroids and planetary science, gravitation, stellar evolution, galaxies and cosmology

Mathematics

spherical trigonometry, infinite series, interpolation, coordinate transfor-mations, matrices, differential and integral calculus, vector calculus, numerical methods, differential equations

Physics

classical mechanics, celestial mechanics, introductions to electromagnetic theory, relativity, quantum mechanics

Other

computer programming in Visual Python, error analysis, research interests of faculty

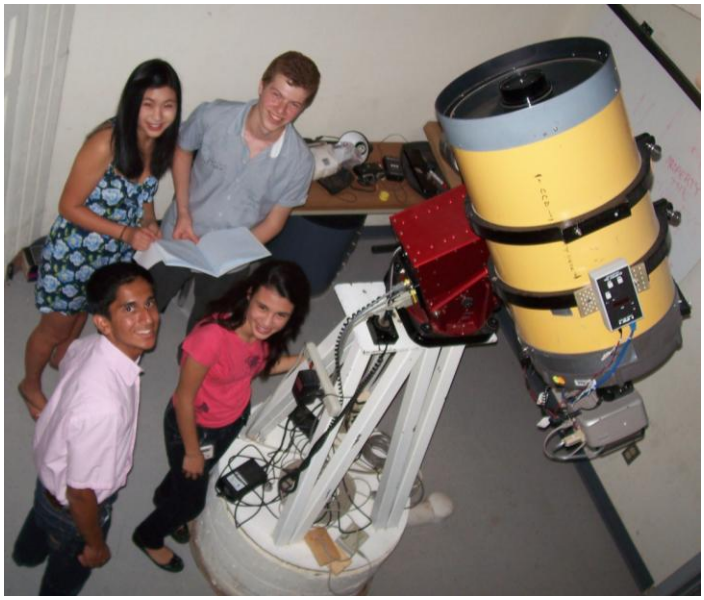
Curriculum Supplements

About twice a week, a guest makes a presentation not necessarily related to the curriculum, followed by questions and open-ended discussions. A list of guest speakers from the most recent summer may be found on the Program tab of the website.

Rounding out the curriculum are regular recreational excursions and at least two behind-the-scenes field trips to scientific institutions, for example to NASA's Jet Propulsion Lab (from the Ojai campus), or the Very Large Array (from the Socorro campus). Organized social events include parties, dances, games / sports, and a talent show.

Daily Routine

Most weekdays feature morning and afternoon lectures. After dark, teams of three students, accompanied by a teaching assistant, go to the observatory in turn to make an observation of their chosen asteroid. Students operate the telescopes and other equipment themselves. When not observing they can be found working together on homework or their orbit determination programs, playing sports or other interactive games, or socializing.



SSP is operated by an independent 501(c)3 nonprofit, operated and largely funded by its own alumni, in cooperation with Caltech, MIT, and host campuses New Mexico Tech and Westmont College. SSP is an accredited observing affiliate of the Harvard/Smithsonian Center for Astrophysics. For complete information, including application and instructions, visit ***summerscience.org****.*