

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. A program fee is charged for the six week residential session, with generous need-based financial aid available. 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 calculation of its orbital elements. 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 reduce the data. Their observations are submitted to the Minor Planet Center at the Harvard-Smithsonian Center for Astrophysics for archival.

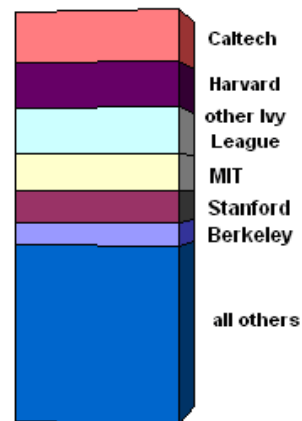
Students find SSP's unified curriculum, and refreshing emphasis on teamwork rather than competition, to be both challenging and motivating. They are often surprised to discover that being surrounded by equally bright and interesting peers and mentors is as rewarding socially as it is intellectually.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

Undergraduate Colleges of SSP Alumni



Lecture Topics

Lectures are designed both to develop a thorough understanding of the orbit determination problem, and to provide exposure to related concepts as chosen by the faculty. The academic curriculum consists of approximately 140 hours of lectures: 30% in mathematics, 30% in physics, 25% in astronomy, and 15% in other areas. Material is presented at a college sophomore/junior pace and level. Regular homework assignments reinforce the lectures.

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

Astronomy

celestial coordinates, analog and digital observational techniques and image reduction, asteroids and planetary science, gravitation, stellar structure and evolution, galaxies and cosmology

Mathematics

spherical trigonometry, infinite series, matrices, differential and integral calculus, vector calculus, numerical methods, differential equations

Physics

classical mechanics, celestial mechanics, electromagnetic theory, atomic physics, optics, introduction to relativity and quantum mechanics

Other

computer programming, college admissions, science and society, current 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. Guest speakers in recent years, for example, have included Dr. Leon Lederman (Nobel Laureate in Physics), Mitchell Kapor (SSP '66 and founder of Lotus Development Corp.), James "The Amazing" Randi (magician, author, and investigator of pseudo-science), Ray Kurzweil (entrepreneur and author of *The Age of Spiritual Machines*), and Caltech Prof. Maarten Schmidt (discoverer of quasars, in his 33rd visit to SSP since 1960).

Teaching assistants pose "Questions Of the Day" (QOD) emphasizing logical thinking or some basic physical principle.

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 birthday parties, dances, 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 corporation, controlled and largely funded by its own alumni, in cooperation with New Mexico Institute of Mining and Technology, California Institute of Technology, and Massachusetts Institute of Technology. Sponsors include Lockheed Martin / Sandia National Lab and Los Alamos National Lab. SSP is an accredited observing affiliate of the Harvard/Smithsonian Center for Astrophysics. For complete information, including application and instructions, visit summerscience.org.