

Along the Olive Walk

a walking tour of

Caltech



THE CALIFORNIA INSTITUTE OF TECHNOLOGY IS AN INDEPENDENT, PRIVATELY SUPPORTED UNIVERSITY THAT CONDUCTS RESEARCH AND INSTRUCTION IN SCIENCE AND ENGINEERING. THE INSTITUTE HAS 290 PROFESSORIAL FACULTY AND A STUDENT BODY OF 900 UNDERGRADUATE AND 1,200 GRADUATE STUDENTS, AND OPERATES SEVERAL OFF-CAMPUS RESEARCH FACILITIES, INCLUDING THE JET PROPULSION LABORATORY, PALOMAR OBSERVATORY, LIGO, AND THE W. M. KECK OBSERVATORY.

SINCE 1923, CALTECH FACULTY AND ALUMNI HAVE WON 32 NOBEL PRIZES AND FIVE CRAWFORD PRIZES. FORTY-EIGHT FACULTY AND ALUMNI HAVE BEEN AWARDED THE NATIONAL MEDAL OF SCIENCE, AND 10 HAVE RECEIVED THE NATIONAL MEDAL OF TECHNOLOGY.

1

Your numbered tour of campus begins at **Steele House**, home of the Office of Undergraduate Admissions. Walk north (toward the mountains); the first building to your left will be **Avery House**, a residence for undergraduates, graduate students, faculty, and occasional visiting scholars.

Turn right (east) and cross Holliston Avenue. Proceed down the walkway until you reach a small parking lot. Bear left, walking through the parking lot and down the driveway past two houses (the offices of Caltech Media Relations and Public Relations). You should now be on Hill Avenue.

Turn right (south) and head down the street, past the houses where Caltech's Alumni Association, Einstein Papers Project, and Industrial Relations Center are located, until you come to 415 South Hill Avenue.

2

This is the **President's Residence**. The freshman class traditionally begins the year here, with a backyard picnic the evening before the students leave for a three-day new-student orientation program.

On the corner of Hill Avenue and San Pasqual Street are two graduate residences, where some of Caltech's 1,200 graduate students live. Located at the opposite end of campus, on Catalina Avenue (*not shown on map*), are three complexes with 200 more grad student apartments. Cross San Pasqual Street and continue down Hill Avenue.

3

About halfway down the block between San Pasqual Street and California Boulevard, you will come to the entrance to the parking lot of the **Athenaeum**, Caltech's faculty club. Proceed up the driveway from the sidewalk and bear right. Go up the stairs and enter the lobby.

The Athenaeum was modeled after the faculty clubs at Oxford and Cambridge universities and is the center of social activities for the teaching, research, and administrative staffs of Caltech. The Athenaeum was designed by architect Gordon Kaufmann and built in 1930, although its first formal dinner was delayed until 1931, when Albert Einstein arrived for a three-month visit to the campus. The building was funded by Mr. and Mrs. Allan Balch, who gave a substantial gift

of stocks and bonds to Caltech in 1929, which the Institute astutely sold shortly before the stock-market crash. The building may look familiar to you, because filmmakers often use its lounge and courtyards as movie sets.

Proceed down the short hall to your left (or straight ahead, if you've been in the lounge), and exit through the door leading into the courtyard.

4

Ahead of you stretches a path called the **Olive Walk**, named for the olive trees planted as part of the Mediterranean theme of the Athenaeum and the south student houses (on your left). Gordon Kaufmann was also the architect of these four houses. They were built in 1931 and, like the Athenaeum, were designed around a system of hallways and courtyards. Inside are smaller units called "alleys," a concept based on the residence system at Oxford University. That particular design was selected to try to develop both loyalty and "wholesome rivalry" among students, thereby lessening the appeal of fraternities.

The Student Activities Center, in the houses' interconnected basements, contains the student coffeehouse; reading, club, and game rooms; soundproof music rehearsal rooms; a silk-screen press; and facilities for many other extracurricular activities.

The three student houses on your right were constructed in 1960. More modern in style, they too were built around a system of courtyards and alleys.

The 1.3-ton cannon that sits in front of Fleming House is a relic of the Franco-Prussian War, and is on loan from Southwestern Academy in San Marino. A harmless—but noisy—charge is fired to celebrate such occasions as commencement or the last day of the academic term.

5

Turn left onto the intersecting brick walkway and proceed down the stairs. On your right is a windowless building known as the **Synchrotron Lab** (the synchrotron itself, a one-billion-volt electron accelerator, was dismantled in 1970). The building was originally a giant clean room built for the decade-long (1936–1946) job of grinding and polishing the mirror for the 200-inch Hale Telescope at Palomar Observatory.

Over the decades Caltech has maintained several off-campus facilities for research. Most of these are for astronomy, which requires much darker skies and clearer air than Pasadena can provide. Our astronomers do much of their work in San Diego County, at the **Palomar Observatory**, home of (among other instruments) the 200-inch Hale Telescope. The 200-inch was until recently the most powerful optical telescope in the world, and is still one of the most productive. A new generation of technology has made it possible to build even larger telescopes. The largest of these are the twin 10-meter **Keck Telescopes**, which Caltech operates in cooperation with the University of California on Mauna Kea, Hawaii. The two telescopes combine their light through a process called interferometry, effectively functioning as a single telescope with a mirror 85 meters in diameter.

At the **Owens Valley Radio Observatory** (OVRO), in Big Pine, California, about 250 miles north of campus, scientists study the universe at millimeter wavelengths, the portion of the electromagnetic spectrum at which the events leading up to star and galaxy formation leave their signature. Near OVRO, at Cedar Flat in the Inyo Mountains, Caltech and the Universities of California (Berkeley), Illinois, and Maryland recently began operation of a 15-element millimeter-wave interferometer, CARMA, the Combined Array for Research in Millimeter-wave Astronomy. The **Chajnantor Observatory**, situated at an altitude of 16,700 feet in the Chilean Andes, is engaged in high-sensitivity observations of the very early universe with the Cosmic Background Imager—a 13-element interferometric array of telescopes.

6

Retrace your steps and return to the Olive Walk. There are about 130 olive trees on campus. Recently, a group of students and staff members decided to harvest the olives and make oil. A company has since been engaged to press the fruit for them, and now there is a talk of selling Caltech olive oil in the bookstore. The first Olive Walk Harvest Festival is planned for fall 2007.

Ahead and slightly to your left is the two-story **Winnett Student Center**. (If you walk through the arches you'll see a brick wall. The bricks with

names on them were salvaged from the fireplace in the Dugout, a 1920s student hangout. Students purchased the bricks for \$1 apiece to help fund the Dugout's construction.) This building houses the Caltech Bookstore, the Caltech Wired computer store, a lounge, a clubroom, and the Red Door Café.

Across the Olive Walk from Winnett are the three buildings that make up the Graduate Aeronautical Laboratories: **Firestone**, **Guggenheim**, and **Karman** (around the corner behind Guggenheim). Because Firestone Tire Company donated the money for the Firestone Lab, student mythology has it that the lattice-work on the front of the building represents tire tracks. (It was actually inspired by Moorish window grilles and/or Mayan ornamentation.)

7

Up on the roof of **Guggenheim**, the building connected to Firestone by the latticework-covered bridge, is the T5 hypervelocity shock tunnel, which is used to simulate such phenomena as entry into planetary atmospheres and aerodynamic braking.

Guggenheim itself houses wind tunnels used to test the aerodynamics of airplanes, automobiles, and other vehicles. These laboratories played a vital role in the development of the aircraft industry in Southern California, and they spawned Caltech's **Jet Propulsion Laboratory** (JPL), where many of the first successful modern rockets were developed.

Administered by Caltech, JPL is a NASA laboratory located about 10 miles northwest of campus. It is best known for robotic space flight. JPL spacecraft have visited every planet in the solar system. Notable recent missions have included Galileo (to Jupiter), Cassini (to Saturn), Pathfinder, Global Surveyor, and the Odyssey missions to Mars. JPL also conducts Earth-observation missions, using satellites to study phenomena like El Niño.

To your right is the **Thomas Laboratory of Engineering**, where, along with projects in civil and mechanical engineering, engineers are developing ways to build more earthquake-resistant dams, buildings, and power plants.

8

Ahead of you is a landscaped area marking the site of Throop Hall, the first building on the Caltech campus. Built in 1910, Throop was torn down after suffering extensive damage in the 1971 Sylmar earthquake (magnitude 6.7). The rocks you see around the pools are up to 75 million years old and were chosen by members of the geological and planetary sciences division as examples of the various rock types in the San Gabriel Mountains just north of Pasadena. The rock collection also includes two 20-year-old "pseudoliths"; see if you can spot them. A list of the rocks, grouped by age and type, is affixed to one of the large boulders.

9

As you proceed along the garden path and up the stairs, you will see the nine-story **Millikan Memorial** building, which houses the main campus library as well as Caltech's fund-raising offices. Completed in 1967, it was designed to withstand earthquakes of magnitude 8.0.

The building to your left is actually two buildings. On the left-hand side, where the clock is, is **Kellogg Radiation Laboratory**. The high-current, high-stability particle accelerator in Kellogg Lab was custom designed by our own physicists to study nuclear astrophysics, and is the only one of its kind in the world. This is also where the late Willy Fowler (who won the 1983 Nobel Prize in Physics) studied how the elements that make up our world formed inside stars.

On the right-hand side, where the arches begin, is the **Sloan Laboratory of Mathematics and Physics**, where scientists study nanostructures—devices that contain several hundred to a few thousand atoms and that obey the laws of quantum mechanics instead of classical physics.



10 As you walk along the arcade on the left-hand side of the pond surrounding Millikan Memorial, you will find a bust of physicist Robert A. Millikan, the administrative head of the Institute from 1921 to 1945 (he declined the title of president). Millikan, along with astronomer George Ellery Hale and chemist Arthur Amos Noyes, set Caltech on its modern course. (His nose is shiny from students' having rubbed it for luck before exams.) Millikan received the Nobel Prize in 1923 for his measurement of the charge of the electron.

On the opposite side of the pond stands a 400-year-old Engelmann oak. Directly behind the oak is a bust of George Ellery Hale.

And in the pond is **Water Forms 1991**, a sculpture by local artist George Baker. It was commissioned by friends of Caltech in honor of the Institute's centennial.

11 The arcade on your left continues past the **Bridge Laboratory of Physics**, where all Caltech undergraduates take five terms of physics courses. Go inside the first door, marked "East Bridge." Halfway down the main hallway, on the left, is a display case holding what was once the world's smallest motor. In 1960 the late Nobel Laureate Richard Feynman offered \$1,000 to the first person who could design a rotating electric motor that could be controlled from the outside and was only 1/64 inch cubed. Here you see what William McLellan (Caltech class of '50) presented to Feynman two and a half months of lunch hours later. The McLellan Micromotor weighs 250 millionths of a gram, has 13 parts, and was built with the aid of a microscope, a watchmaker's lathe, and a toothpick. Unfortunately, the motor is worn out and no longer runs.

12 Exit Bridge the way you came in, turn left, and walk down to the next arcade. There, the second doorway on the left is the main entry to the **Arms Laboratory of the Geological Sciences**. Geologists here study such things as how minerals concentrate into ores, how to read ancient climates from traces of radioactive elements left in rocks and seafloor sediments, and how glaciers move. Arms also houses "The Lunatic

Asylum," a set of clean rooms built to analyze rock samples brought back from the moon by the Apollo astronauts.

13 Continuing along the arcade, you will find a small courtyard just beyond Arms. On its far side is the **Robinson Laboratory of Astrophysics**. The dome on the roof was built to house a 1/10-scale model of the Hale Telescope. The model was built to test the engineering principles used in the design of the giant telescope, which saw first light in 1948. Astronomers and astrophysicists in this building are using data from Caltech's telescopes (and other facilities worldwide) to study quasars, black holes, and other mysteries of outer space.

The sculpture in the courtyard has been nicknamed the Quad Angel. Trustee Harvey Mudd presented this marble birdbath to the Institute in 1939, when the geology lab commemorating his father, Seeley W. Mudd, was dedicated. That building, familiarly known as North Mudd, stands to the right of the sculpture.

If you step out from under the arcade into Bechtel Mall and look around, you will note the architectural similarities in the buildings, which date from the 1930s. The facades are decorated with lively reliefs symbolizing the types of research and study done inside (at least at the time the buildings were designed).

14 Proceed along the arcade in front of the **Mudd Laboratory of the Geological Sciences**, as North Mudd is officially known. Research here focuses on the natural magnetic compasses in living creatures such as birds and fish, how ancient





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climates can be read in trees, and how California's San Andreas fault will behave, or misbehave, in the future.

15

At the end of the mall, turn left at the sidewalk (be sure to notice the particularly spectacular set of reliefs on the street side of North Mudd). Walk down to the corner of California Boulevard and Wilson Avenue. Here you will find South Mudd (the **Mudd Laboratory of the Geological Sciences**), the home of the Seismological Laboratory, which is a hub of activity following any significant earthquake. Go inside and up the stairs to the lobby; there you will find three seismographic recorders and an interactive exhibit about earthquakes and seismology.

Earthquake study has a long history at Caltech. In the early 1930s, Beno Gutenberg and Charles Richter developed the well-known scale for grading an earthquake's severity. The Richter Scale has been replaced (for seismological use, at any rate) by the moment-magnitude scale, developed by the Seismo Lab's former director, Hiroo Kanamori.

Other geological investigations taking place in South Mudd concern volcanoes, global and regional plate motion, marine magnetics, dynamic meteorology and climatology, and the evolution of the earth and the planets.

Returning outside, you'll see the **Keith Spalding Building** across California Boulevard. This structure houses the Spitzer Science Center, which supports science operations for the Spitzer Space Telescope, launched in August 2003. Next to it is the construction site of the future Cahill Center for Astronomy and Astrophysics. Beyond Spalding are **Brown Gymnasium** and **Braun Athletic Center**, facilities that include two swimming pools, a weight room, six tennis courts, two basketball courts, an aerobics room, six racquetball/handball/wallyball courts, a climbing wall, and an all-weather track. All Caltech sports are open to any interested undergraduate.

16

Turn north and retrace your steps. At the entrance to Bechtel Mall, North Mudd is on your right and the **Kerckhoff Laboratories of the Biological Sciences** are on your left.

Kerckhoff houses one of two *Drosophila* (fruit fly) repositories in the United States. The late biologist Ed Lewis, who won a 1995 Nobel Prize for his research on *Drosophila* genetics, had his lab here.

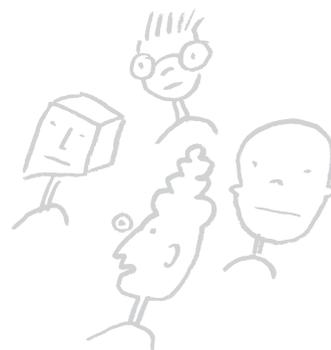
17

Proceed along Wilson Avenue, past Kerckhoff and the **Alles Laboratory for Molecular Biology**. Scientists in Alles study developmental biology—how the single cell of a fertilized egg becomes the specialized cells of an adult organism according to instructions carried in the DNA.

18

On your right as you turn the corner to reenter the campus you will find the **Norman W. Church Laboratory for Chemical Biology**, a building with an unusual history. In the 1930s, when a horse named Proclivity—owned by Norman Church—won an important race at Santa Anita Race Track, it was claimed that Proclivity had been doped. To clear his name and that of his horse, Church called on Caltech's Arnold Beckman, then an assistant professor of chemistry, who found no evidence of such doping. Later, after reading about Caltech's work in chemical biology, Norman Church donated the funds for this building. It was in this lab that the late Nobel Laureate Roger Sperry discovered that the left and right hemispheres of our brains each have unique capabilities.

Across the path to your left are the **Braun Laboratories**. Scientists here work in the fields of molecular biology, immunology, and cell-surface chemistry. They are using techniques of genetic engineering to understand how genes



and proteins work, and to attack such major diseases as hepatitis and multiple sclerosis.

Mead Lab, to the northeast of Braun, houses student chemistry laboratories.

19

The next building on your left is the **Noyes Laboratory of Chemical Physics**, named for Arthur Amos Noyes, Caltech's first director of chemical research. Some of the scientists in this building take "snapshots" of the birth of a molecule while the chemical reaction is still occurring; others are studying catalysis, or working to develop an electronic "nose" that can identify the chemical constituents in a vapor.

Next, on your right, between the **Church** and **Crellin** laboratories, you will see an archway decorated with the reliefs that Alexander Stirling Calder (father of the Alexander Calder of mobile fame) designed in 1910 for the facade of Throop Hall. They were put in storage after Throop's demolition in 1972 and reinstalled here in early 1986. The six figures on the arches represent, from the left, Nature (Pan with his pipes), Art (a poet with stylus and tablet), Energy (bearing an inert human form on his back), Science (lighting the torch in his right hand from the sun that forms the central cartouche over the archway), winged Imagination (exulting in yet-unexplored possibilities), and helmeted Law (bearing tablets).

Behind the arches is the Beckman Laboratory of Chemical Synthesis, which encompasses portions of the Church and Crellin labs. Chemists in this building are synthesizing a variety of materials, from molecules that read and recognize specific bits of DNA to plastics that conduct electricity or might act as magnets.

20

On the left side of the path is **Moore's Stone Volute**, a sculpture by Lloyd Hamrol. The sculpture was donated to Caltech by Gordon and Betty Moore in connection with their gift of the Moore Laboratory of Engineering, which you will see later in the tour.

To your right is the **Gates Chemistry Library**, whose stone columns are decorated with Mayan motifs. To the left of the library is the **Parsons-Gates Hall of Administration**, the oldest building on campus. Built in 1917

as a chemistry lab, since 1983 it has housed the offices of the president and other senior administrators.

21

Dabney Hall of the Humanities, directly across the lawn from Parsons-Gates, houses Caltech's literature, foreign language, and philosophy faculty. Behind Dabney Hall is **Garden of Associates**, the site of many campus gatherings. Enter the gardens through the small wrought-iron gate. On the far side, under the trees, stands a life-size bronze statue of Tenjin, the legendary Japanese patron of scholars and writers. Behind the statue of Tenjin and beyond the wall rises the **Sherman Fairchild Library of Engineering and Applied Science**. Dabney Lounge, behind the three large doors at the south end of the gardens, is used for chamber concerts, dance classes, plays, and other events. Exit the garden through the same gate you entered.

22

To the north is a large lawn, known as Beckman Mall, where commencement is held every year. Two buildings flank the lawn. On the left is the **Beckman Laboratories of Behavioral Biology**, where researchers investigate how the brain processes sensory information. On the right is **Baxter Hall of the Humanities and Social Sciences**. This building houses historians, economists, and political and social scientists, many of whom have pioneered the application of experimental methods to their fields of study. Baxter Hall contains the 400-seat **Ramo Auditorium** and a large lecture hall.

23

Proceed down the mall to the white circular building, **Beckman Auditorium**. Each year, the auditorium's diverse schedule of lectures, concerts, dance recitals, and theatrical programs attracts audiences from the greater Los Angeles area. Designed by noted architect Edward Durrell Stone, Beckman Auditorium is the most unusual building on campus. (Yes, the outdoor light fixtures are supposed to suggest atoms.) Go up the stairs to the auditorium and walk clockwise around it.

24 At the end of the rectangular reflecting pool to your left (whose floor, tiled in a double-helical pattern, caused it to be nicknamed “the gene pool”), is **Beckman Institute**. The largest building on campus, Beckman Institute brings together scientists from a variety of disciplines who have similar research interests. Here theorists interact with experimentalists, biologists with chemists and physicists. It also houses the Institute Archives and the Beckman Room, which contains exhibits about the history of chemistry and the scientific contributions of Caltech alumnus Arnold Beckman.

Just to the northwest of Beckman Institute is the **Broad Center for the Biological Sciences**, the cornerstone of a \$100 million initiative to strengthen Caltech’s research efforts in those fields. The Broad Center houses three major new research facilities: a magnetic resonance imaging center, a biomolecular structures laboratory, and a genetic resources laboratory.

25 Continuing around Beckman Auditorium, you will see to your right the **Gordon and Betty Moore Laboratory of Engineering**, in which Caltech faculty conduct research in wireless communication, networking, distributed computing, and other emerging fields of engineering and applied science. This building is also home to the computation and neural systems program—the first of its kind in the world—in which biologists, computer scientists, chemists, physicists, and others collaborate to apply the lessons of biology to computer design, and to use computer simulations to study the brain.

Moore Lab also houses the National Science Foundation’s Center for Neuromorphic Systems Engineering, where scientists and engineers



26 As you continue to circle Beckman Auditorium, you will see the **Thomas J. Watson, Sr., Laboratories of Applied Physics** to the right of Moore Lab. Watson houses research in solid-state electronics and plasma physics. Scientists here are developing lasers and other electronic devices that will be used in light-wave communications systems of the future. Go down the stairs and take the walkway that goes off diagonally to the right.

27 On your right are the **Keck Engineering Laboratories**, which contain facilities for studying environmental engineering, materials science, and bioengineering. Acid rain and acid fog are also a focus of research here. Across the walkway from Keck are two buildings, the **Steele Laboratory of Electrical Sciences** and the **Powell-Booth Computing Center**.

Researchers in Steele Lab are working in such areas as signal- and information-processing theory (many of their techniques have been used by spacecraft to send pictures of distant worlds back to Earth), and are developing optical computers that “think” with photons of light instead of electrons.

In Powell-Booth, computer scientists are developing supercomputers designed to far outperform even the most powerful computers in use today. Such supercomputers will enable scientists and engineers to better forecast weather, design aircraft, search for oil, engineer proteins, and understand the fine structure of the atom.

Straight ahead is the **Spalding Laboratory of Engineering**, where work is being carried out in various branches of chemical engineering.

28

The left side of the walkway brings you past the **Jorgensen Laboratory of Information Science**, which is the home of the Institute's academic programs in computer science. Caltech was the first institution to offer an undergraduate course in the parallel-programming languages used by supercomputers.

29

The next building on your left houses the **Facilities Management** offices and shops. To your right across the mall are **Chandler Dining Hall** and the Convenience Store.

30

Proceed to Holliston Avenue and turn left, passing more Facilities Management shops and the **Human Resources** office. Across from Human Resources is the **Center for Student Services**, which houses the offices of Financial Aid, the graduate and undergraduate deans, Registrar, Career Development Center, Fellowships Advising and Study Abroad, International Student Programs, Minority Student Education, Housing, and Women's Center. A bit farther ahead on the left you'll see the **Central Engineering Services** building, where the offices of Technology Transfer and Intellectual Property are located. Walk a few feet farther north to return to Steele House, where your tour began.



Thank you for visiting our campus. If you have any questions, please feel free to contact the Office of Undergraduate Admissions or the Office of Public Relations.

Prospective students:

Write: Office of Undergraduate Admissions
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Other visitors:

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