Caltech

A SELF-GUIDED

Walking Tour


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www.caltech.edu

Welcome to Caltech, founded in 1891 as Throop University.

For more than a century, the Institute has advanced understanding of the earth, the universe, and the human mind. With a relatively small community of approximately 300 faculty, 2,200 undergraduate and graduate students, and 600 postdoctoral scholars, Caltech has an outsized impact on science and society. Researchers on campus and at the Jet Propulsion Laboratory (JPL), which Caltech manages on behalf of NASA, have launched new fields of study and invented world-changing tools and technologies while seeking answers to the scientific questions that define our times.

Through this 60-minute walking tour, we invite you to learn more about Caltech's history, study examples of noteworthy campus architecture, enjoy a glimpse of student life, and explore some of the groundbreaking investigations being conducted across our six academic divisions: biology and biological engineering; chemistry and chemical engineering; engineering and applied science; geological and planetary sciences; humanities and social sciences; and physics, mathematics and astronomy.

You may begin your tour at any point on this numbered map. We suggest starting at Beckman Institute, situated on the west side of campus.

Beckman Institute

Approaching Beckman Institute from the east, you will encounter a rectangular reflecting pool, nicknamed "the Gene Pool" because of its double helix tile design. Beckman Institute was named for Arnold Beckman (PhD '28), inventor of the pH meter, founder of Beckman Instruments, and longtime benefactor of Caltech. The building was designed as a center for interdisciplinary research in the chemical and biological sciences. Decorative details such as acanthus leaves and scallop shapes recall early campus architecture, while Caltech's symbol, the torch of knowledge, is featured on east- and west-facing walls. Beckman Institute also houses the Caltech Archives and the Beckman Room (Caltech's science museum), which is open to walk-in visitors on the first Friday of each month during the academic year.

Proceed west toward Wilson Avenue, under the Beckman Institute arches, and through the Glanville Courtyard. To the northwest, you will see:

Broad Center for the Biological Sciences

The Broad Center brings together students and faculty pursuing studies in three critical areas of biology and biological engineering: magnetic imaging, computational molecular biology, and the biology of emotion and perception. *(Refreshments and restrooms may be found at Broad Café, behind the main Broad Center building.)*

Taking shape to the north of Broad, along Del Mar Boulevard, is the Chen Neuroscience Research Building. Scheduled to open in the fall of 2020, the 150,000-square-foot facility will serve as a hub for pioneering brain research.

Proceed south toward Mead Memorial Undergraduate Chemistry Laboratory. Then, turn and continue east past Noyes Laboratory of Chemical Physics. Just southeast of Noyes, find:

Schlinger Laboratory for Chemistry and Chemical Engineering

Completed in 2010, the lab brings together chemists and chemical engineers, making possible discoveries and innovations in pharmaceutical preparation, catalyst design for solar energy conversion, and air pollution management. The facility has received gold certification from the Leadership in Energy and Environmental Design (LEED) green building rating system and incorporates locally sourced and recycled building materials.

Proceed east on San Pasqual Walk. Continue past the Gates Laboratory of Chemistry Annex, with columns featuring Mayan revival reliefs, and around Parsons-Gates Hall of Administration to its east-facing main entrance.

Parsons-Gates Hall of Administration

Gates Laboratory of Chemistry was constructed here in 1917, in part to lure chemist Arthur A. Noyes to campus. Chemist Linus Pauling, one of 38 Caltech alumni and faculty to have received Nobel Prizes, conducted his research in the Gates lab. The building is Caltech's oldest and the first to cross the hundred-year threshold. Severely damaged in the 1971 Sylmar earthquake, the building was retired as a laboratory and, after extensive renovation, was reopened in 1983 as the Parsons-Gates Hall of Administration.

Across the lawn behind you, note Dabney Hall of the Humanities, another of Caltech's oldest buildings, constructed in 1927 and housing faculty in literature, foreign language, and philosophy. Caltech's founders believed the humanities were important to a well-rounded education as well as to the diversity of perspective that makes scientific progress possible. The humanities and social sciences remain essential to Caltech's core curriculum and to intellectual life at the Institute.

From Parsons-Gates, go west past Crellin Laboratory of Chemistry. Then, continue west through the arcade along the north side of Bechtel Mall toward Wilson Avenue and the west-facing entrance of:

Kerckhoff Laboratories of the Biological Sciences

Kerckhoff was constructed in 1928 to house the Institute's new biology division, led by biologist and geneticist Thomas Hunt Morgan. Cast stone carvings on the building's exterior represent the investigations undertaken within and include crabs, seahorses, lobsters, peapods, and corn. Kerckhoff houses one of two fruit fly repositories in the United States, and Nobel laureates Morgan, Ed Lewis, and Max Delbrück all had labs here.

From Kerckhoff, proceed south toward:

Seeley W. Mudd Laboratory of the Geological Sciences (North Mudd)

It was while working in North Mudd that geochemist Clair Patterson unexpectedly discovered that toxic lead contaminated everything from his lab instruments to ocean water and, most alarmingly, the human body. His findings drove efforts to remove lead from gasoline and to implement environmental protections including the Clean Air Act of 1970. Today, scientists in North Mudd continue to study air and water quality as well as the tectonics of Earth's crust, and the impact of life on the chemical and physical evolution of the planet.

Just south of the Seeley W. Mudd Laboratory is the Seeley G. Mudd Building of Geophysics and Planetary Science. Familiarly known as South Mudd, the building is home to the Seismological Laboratory, a world-renowned center for earthquake research. Caltech has a legacy of significant contributions to seismology: in the 1930s, Beno Gutenberg and Charles Richter (PhD '28) developed the Richter scale for measuring earthquake magnitude and, nearly 50 years later, Hiroo Kanamori and graduate student Thomas C. Hanks (PhD '72) developed the moment magnitude scale, allowing for more accurate readings of large quakes at greater distances. Today, researchers are working in collaboration with the U.S. Geological Survey and colleagues across the state to develop an earthquake early-warning system.

From North Mudd, continue east along the south side of Bechtel Mall, stopping at the courtyard in front of:

Linde + Robinson Laboratory for Global Environmental Science

A centerpiece of Linde + Robinson is a solar telescope, originally intended for Caltech co-founder and solar astronomer George Ellery Hale. The main part of the instrument, called the coelostat, is situated under the large white dome on the roof of the building. As part of renovations undertaken in 2011, the telescope was adapted to channel sunlight deep into the building, reducing artificial lighting needs.

The Linde + Robinson building, originally constructed in 1932, is also home to the Ronald and Maxine Linde Center for Global Environmental Science. Scientists at the Linde Center collaborate to address critical and complex questions about Earth's climate: how climate has varied in the past and the ways in which it will change in the future; how pollution influences air quality and climate change; what happens to carbon dioxide after it enters the atmosphere.

Proceed south through the Linde + Robinson courtyard and past the *Perception* sculpture toward the public sidewalk. Look across California Boulevard to see:

Cahill Center for Astronomy and Astrophysics

The terra-cotta-colored panels on the distinctive Cahill center were selected to link the building, opened in 2009, to the historic campus. They also provide shade, reducing the need for air conditioning in Caltech's first building to be certified under the LEED green building rating system. Inside, researchers study the origins of the universe; the forces that shape the formation and evolution of galaxies, stars, and planetary systems; the nature of spacetime; and the question of whether life exists outside Earth's solar system.

Just west of Cahill is the Keith Spalding Building of Business Services, which houses the Spitzer Science Center. The center supports science operations for the Spitzer Space Telescope, which launched in August 2003.

East of Cahill, you can see the tennis courts that make up just part of Caltech's athletics facilities. Farther south, though not included on this tour, is Braun Athletic Center, the Institute's main gymnasium. The facility features a 3,500-square-foot weight room, a range of cardiovascular machines, four racquetball courts, and two international squash courts, among other amenities. Two pools, Braun Pool and Alumni Pool, are available for physical education classes, lap and recreational swimming, and intercollegiate swimming, diving, and water polo. In all, student-athletes at Caltech compete on 18 varsity teams.

Proceed east along California Boulevard until you reach the traffic signal. Turn north to re-enter campus via the stairway between Norman Bridge Laboratory of Physics (with decorative medallions representing earth, air, fire, and water) and Linde Hall of Mathematics and Physics. Continue north, past the buildings, until just ahead of you is:

Millikan Pond

The pond and the adjacent Robert A. Millikan Memorial Building are both named for the Nobel Prize-winning physicist and Caltech co-founder. The nine-story Millikan tower is Caltech's tallest building and was designed to withstand a magnitude 8.0 earthquake. The building itself is also a research site. A synchronized vibration generator, or "shaker," is installed on the roof for forced vibration tests that simulate the effects of earthquakes. Meanwhile, small seismometers placed throughout the tower allow scientists to measure seismic waves and study their impact on tall structures.

From Millikan, go east and down the pathway through:

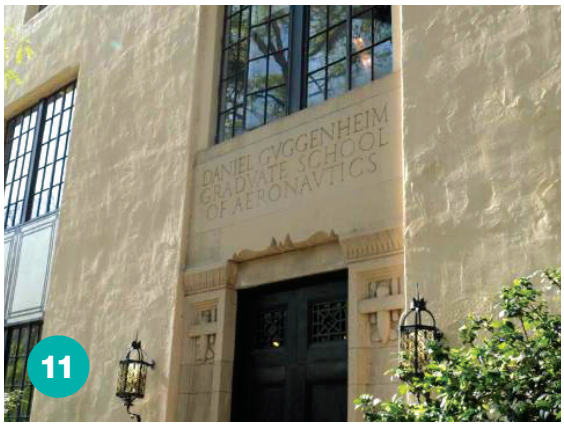
Throop Memorial Garden

The garden marks the site of Caltech's first building. Called Pasadena Hall when it was built in 1910, the building was renamed Throop Hall a decade later, the same year Throop College of Technology became the California Institute of Technology. Like the former Gates Laboratory of Chemistry, Throop Hall was badly damaged in the 1971 Sylmar earthquake, and engineers recommended demolition.

In addition to turtles basking in the sun, note the boulders surrounding the garden's pools. Chosen by members of the Division of Geological and Planetary

Sciences, the rocks represent 2 billion years of California's geological history. A list of the rocks, grouped by age and type, is affixed to one of the large boulders.

To the south, as you continue past Throop Memorial Garden, are the buildings that make up the Graduate Aerospace Laboratories of the California Institute of Technology (GALCIT):



Kármán Laboratory of Fluid Mechanics and Jet Propulsion, Guggenheim Aeronautical Laboratory, and Firestone Flight Sciences Laboratory

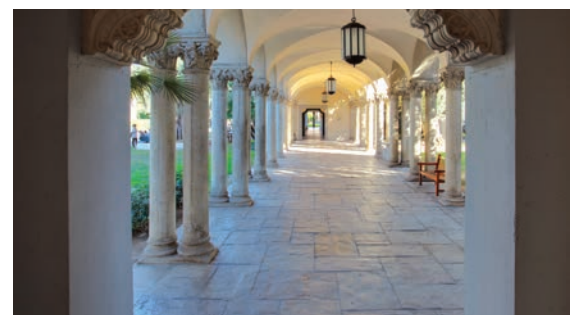
These laboratories played a vital role in the development of California's aerospace industry, with state-of-the-art wind tunnels that have been used to test military and commercial aircraft as well as everything from bicycles to windmills. In recent years, the John W. Lucas Adaptive Wall Wind Tunnel has helped engineers develop a device that allows planes to fly with smaller tails, increasing fuel efficiency and reducing environmental impact.

It was also Caltech researchers, led by physicist and aerospace engineer Theodore von Kármán, who embarked on experiments leading to the creation of the Jet Propulsion Laboratory. Located approximately six miles northwest of campus, JPL is a world-leading center for robotic exploration of the solar system. Caltech has managed the Lab on behalf of NASA since 1958, with faculty leading numerous missions including Voyager, the Mars Science Laboratory, and the Nuclear Spectroscopic Telescope Array (NuSTAR).

Continuing Caltech's tradition of innovation, scientists and engineers at the Center for Autonomous Systems and Technologies, located inside Kármán, collaborate to develop the hardware and artificial intelligence that will drive autonomous systems for exploration, medicine, and everyday life.

Just north of Guggenheim is Gates-Thomas Laboratory of Engineering, where, among other civil and mechanical engineering projects, students and faculty develop ways to build more earthquake-resistant dams, buildings, and power plants.

Proceeding east from Firestone, ahead of you stretches a path known as the Olive Walk, designed by landscape architect Florence Yoch, who also designed the gardens for the sets in *Gone With the Wind.* In the past, students and other members of the Caltech community have harvested the olives to be processed for oil. On the south side of the Olive Walk are:



The student residences of Blacker, Dabney, Fleming, and Ricketts

The South Houses were built in 1931 and modeled on student residences at Oxford University. In one of their interconnected basements is the Student

Activities Center, featuring club rooms, soundproof music rehearsal spaces, and other facilities.

The 1.3-ton cannon that sits in front of Fleming House is a relic of the Franco-Prussian War. A harmless, albeit loud, charge is fired to celebrate occasions such as commencement or the last day of the academic term. Built decades later, Page, Lloyd, and Ruddock houses are located on the north side of the Olive Walk.

Continue east along the Olive Walk until just ahead of you is:

The Athenaeum

Caltech co-founder George Ellery Hale envisioned the Athenaeum as a gathering place for great thinkers at the Institute and other nearby cultural institutions. The Mediterranean-style building was designed by architect Gordon Kaufmann, with ceilings in the entry hall and dining rooms designed by Vatican-trained architect Giovanni Smeraldi. The club's first formal dinner was held in 1931 and hosted by the Caltech Associates in honor of Albert Einstein, who was visiting campus with his wife, Elsa. Two other Nobel laureates, Robert Millikan and Albert Michelson, also attended. Einstein later resided in one of the Athenaeum's guest suites while on campus as a visiting professor during the winters of 1931, 1932, and 1933.

From the Athenaeum, proceed north along the paved walkway to San Pasqual Street. At San Pasqual, go west to re-enter the campus core via San Pasqual Walk. On the south side of San Pasqual Walk is:

Chandler Dining Hall

On Chandler's roof are 48 aeroponic towers that are used to grow vegetables for meals served to the Caltech community. *(Refreshments and restrooms can be found inside the dining hall facility, at Chandler Café.)*

Just southwest of Chandler is the Hameetman Center, located at the former site of the Winnett Student Center. The reimagined gathering space for the Caltech community features student club rooms, a lounge, music rehearsal space, a market, and other amenities. *(Refreshments and restrooms are available inside Hameetman Center.)*

From Chandler, continue west to:

Jorgensen Laboratory

Jorgensen houses the Resnick Sustainability Institute, which fosters advances in energy science and technology through research, education, and communication. From new classes of materials for photovoltaics to new biochemical processes that reduce the carbon footprint of industry, Resnick researchers are addressing critical challenges in renewable energy and sustainability.

Continue west past the Powell-Booth Laboratory for Computational Science. Then, go north. Directly west of you stands:

W. M. Keck Engineering Laboratories

Inside Keck, scientists and engineers with the Cherng Department of Medical Engineering design and create medical devices and systems, including diagnostics, therapeutics, implants, and noninvasive imaging tools, which will lead to more affordable, more effective, and more accessible health care.

Proceed north toward the Watson Laboratories of Applied Physics and then east along the paved access road. Turn north again and walk through the pathway between the Annenberg Center for Information Science and Technology and the Moore Laboratory of Engineering.

Annenberg Center for Information Science and Technology

Completed in 2009, the Annenberg Center houses most of Caltech's Computing and Mathematical Sciences (CMS) department. Major developments in computer science over recent decades, from semiconductor chip design to advanced film animation techniques, have had their start in the minds and labs of students and faculty at Caltech. Today, CMS researchers continue to investigate high-impact topics such as machine learning, quantum computing and cryptography, and the computational aspects of economic markets.

Just west of Annenberg is:

Moore Laboratory of Engineering

Named for Gordon Moore (PhD '54), Caltech alumnus and co-founder of Intel, the lab fosters research in wireless communication, networking, distributed computing, and other emerging fields of engineering and applied science. Moore houses a first-of-its-kind program in which biologists, computer scientists, chemists, and physicists collaborate, applying lessons of biology to computer design and using computer simulations to study the brain.

Opposite Moore Lab, on the north side of Moore Walk, is:

Bechtel Residence

Completed in fall 2018, Caltech's newest student residence houses undergraduates from all class levels, along with two faculty in residence, a half-dozen graduate resident associates, and a residential life coordinator. With the addition of Bechtel, Caltech students

have the opportunity to live on campus for all four undergraduate years.

From Bechtel, proceed west to:

Beckman Auditorium

Thirty-two tapered columns support the overhanging roof of this monumental circular structure designed by Edward Durell Stone, the architect behind the Museum of Modern Art in New York and the Kennedy Center in Washington, D.C. (The hanging light fixtures were designed to suggest atoms.) Every year, Caltech's commencement ceremonies are held on Beckman Mall, just to the south of the auditorium and flanked by Baxter Hall of the Humanities and Social Sciences and the Beckman Laboratories of Behavioral Biology.

West of Beckman Auditorium is Beckman Institute, where this self-guided tour began.

We invite you to return to Beckman Auditorium throughout the year to enjoy a broad range of films, performing arts events, and lectures, including the Earnest C. Watson Lecture Series.

For more information, visit events.caltech.edu