



# The California Institute of Technology

## Employees' Guide to Caltech

## The California Institute of Technology

The mission of the California Institute of Technology is to expand human knowledge and benefit society through research integrated with education. We investigate the most challenging, fundamental problems in science and technology in a singularly collegial, interdisciplinary atmosphere, while educating outstanding students to become creative members of society.

Located in Pasadena, California, Caltech is a small, coeducational university dedicated to exceptional instruction and research in engineering and science. The student body is composed of approximately 950 undergraduate and 1,179 graduate students who maintain a high standard of scholarship and intellectual achievement. With an outstanding faculty—including several Nobel laureates—and such off-campus facilities as the Jet Propulsion Laboratory, Palomar Observatory, and the W. M. Keck Observatory, Laser Interferometer Gravitational-Wave Observatory, Owens Valley Radio Observatory, and Kerckhoff Marine Biological Laboratory, Caltech is one of the world's major research centers.

Caltech's achievements have not gone unnoticed. To date a total of 31 Nobel Prizes, 54 National Medals of Science, and 12 National Medals of Technology have been awarded to Caltech faculty and alumni.

### A Brief History of the Institute

Few if any universities are distinguished when they first open, and Caltech was no exception. The Institute traces its origins to a local school of arts and crafts founded in 1891 by the Honorable Amos G. Throop. It has been known as the California Institute of Technology since 1920, when George Ellery Hale, Robert Andrews Millikan, and Arthur Amos Noyes set the school on its new course of pursuing scientific research of the greatest importance.

Over the years succeeding presidents Lee A. DuBridge, Harold Brown, Marvin L. Goldberger, Thomas E. Everhart, David Baltimore and Jean-Lou Chameau have led the Institute as it has achieved worldwide prominence in scientific education and research by producing an amazing array of accomplishments. It was at Caltech that Theodore von Kármán developed the principles that made jet flight possible, that Charles Richter published his logarithmic scale for measuring the magnitude of earthquakes, and that astronomer Maarten Schmidt discovered the nature of quasars. Here Linus Pauling determined the nature of the chemical bond, Max Delbrück conducted the studies of bacterial viruses that led to a new branch of biology called molecular genetics, Murray Gell-Mann theorized that all particles are made up of quarks and antiquarks, and Roger Sperry developed new insights into the implications of right-brain and left-brain functions.



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### The Structure of the Institute

The Board of Trustees, who selects a president to act as the principal administrative officer, governs Caltech. A provost, general counsel and five vice presidents serve under the president as executive officers for the various operations of the Institute — the academic program, the Jet Propulsion Laboratory, Student Affairs, Business & Finance, Development & Institute Relations, Investment Office, and General Counsel.

### The Academic Program

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At Caltech, academic affairs are managed by the provost and are organized under six separate divisions, each with its own chair, who is a member of the faculty. Instruction is carried on by each division, as well as basic research, most of which is financed through grants and fellowships made to the Institute and to individuals by various government agencies, foundations, and industrial organizations. The six academic divisions are:

Biology

Chemistry & Chemical Engineering

Engineering and Applied Science

Humanities and Social Sciences

Physics, Mathematics & Astronomy

Geological and Planetary Sciences

Beneath this apparently simple organization lie some 35 areas of research, many of which cross traditional disciplinary boundaries. In fact, Caltech has long been known as an institution where interdisciplinary approaches to research are encouraged and supported. The following outline of research themes identifies key questions in each area and describes some of the science now under way to answer those questions.

#### The Far Reaches of the Universe

*How did the universe begin?*

*How has it evolved?*

- characterizing the remnants of the Big Bang
- studying the evolution of the galaxies and stars formed by the Big Bang
- searching for gravitational waves with the Laser Interferometer Gravitational-Wave Observatory (LIGO)
- studying the solar system and the universe with new spacecraft

#### The Biological Sciences

*How does the brain work?*

*How do complex organisms develop?*

- drawing on interdisciplinary strengths to tackle these questions in new ways



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- developing technologies to collect more data and formulate new quantitative descriptions
- some applications:
  - biomimetic materials
  - biologically based sensors
  - agriculture/plant genetics
  - biologically inspired computing

### The Search for Life Elsewhere

*How did life evolve on Earth?*

*How might it have evolved elsewhere?*

*How robust is life?*

*What is the simplest organism that can exist?*

- observing planets around other stars with the Keck Telescopes, the Owens Valley Radio Observatory, the Caltech Submillimeter Observatory, and spacecraft to be built in the next decade
- conducting biological and geological investigations of the origin and evolution of life
- designing planetary missions and instrumentation to look for extinct or extant life on Mars, Europa, and other places in the solar system.

### The Global Environment

*How do the earth and its climate work?*

*How and why are they changing?*

- using remotely piloted aircraft to study the atmosphere and clouds
- conducting paleological and satellite observations of ocean currents and winds on a global scale
- developing models to integrate measurements and observations
- characterizing the sources, causes, and effects of seismic activity

### The Humanities and Social Sciences

*What are the broad influences of science and technology on society?*

- understanding relationships between science, ethics, and public policy
- studying the history of California and the West and the history of science

*What are the laws that govern economic and political behavior?*

- using experimental economics to study auctions and markets
- studying market mechanisms for allocating resources or aggregating information
- understanding how people make decisions



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### Matter on the Smallest Scale

*Can we build things atom by atom?*

- creating nano- and micromachines with applications for power sources, aircraft control, and sensors
- manipulating single atoms
- engineering molecules and materials to have novel biological and physical properties

### Simulation and Data Processing

*What do we do with so much information?*

*Can we make sense of the rapidly growing databases in astronomy and the earth, social, and biological sciences?*

- high-performance computer simulation and modeling
- computer algorithms and architectures
- software engineering
- experiments to challenge and refine computational models

### Jet Propulsion Laboratory

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JPL's director is also a Caltech vice president. The Laboratory, which is managed by Caltech for the National Aeronautics and Space Administration, is the leading U.S. center for robotic exploration of the solar system. In addition, JPL has major programs in Earth sciences, astrophysics and fundamental physics, and technology development, and manages NASA's Deep Space Network of telecommunications complexes around the world, which track and control deep space missions.

### Student Affairs

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The vice president for student affairs is the Institute officer responsible for the supervision of departments involving undergraduate and graduate students on campus. These departments are Athletics, Campus Life, Career Development, Counseling Center, Dean of Students, Fellowships Advising and Study Abroad, Financial Aid, Graduate Office, Health Center, Housing, Dining Services, Bookstore, International Student Programs, Center for Diversity, Performing and Creative Arts, Registrar, and Undergraduate Admissions.

### Business & Finance

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The vice president for business and finance is the Institute's chief business and financial officer. The vice president has overall responsibility under the president for finance and accounting,



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sponsored research administration, audit services and Institute compliance, human resources, physical plant, and facilities construction.

### **Development & Institute Relations**

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The vice president for Development & Institute Relations directs and oversees programs having to do with the alumni association, general fundraising for the Institute, and support groups, such as the Associates, whose 1400 members contribute to the general support of Caltech's programs of research and teaching. Other areas of development include the alumni fund, corporate relations, foundation relations, gift and estate planning, principal and major gifts. The vice president for Development & Institute Relations also oversees the Marketing & Communications area which includes: media relations, publications (printed and Web-based), periodicals and public relations. In addition, public events brings Caltech, its programs, and its people to the attention of a variety of publics, by producing events with educational as well as entertainment value.

### **Investment Office**

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The Chief Investment officer is responsible for administrative support and coordination of the Trustee Investment Committee actions, life income agreements, and beneficial interests in trusts and estates; for management of real property investments; and for other duties assigned by the chair of the committee.

### **General Counsel**

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The Office of the General Counsel ("OGC") is the legal advisor to the Institute and is responsible for providing legal services to all Institute organizations, including the Jet Propulsion Laboratory. OGC strives to advance Institute objectives by working proactively with faculty, management, staff, and students and by providing legal services of the highest caliber. OGC serves as the representative of the Institute with respect to all legal proceedings and is the office ultimately responsible for assessing compliance with laws, regulations and other legal controls.