

Mechanical and Civil Engineering California Institute of Technology

Create sustainable, autonomous, and resilient machines and infrastructure





Gates-Thomas Laboratory



Caltech at a glance

- **Small size**

- ~ 300 Professorial faculty
- ~ 1200 Graduate students
- ~ 1000 Undergraduate students
- ~ 600 Post-docs



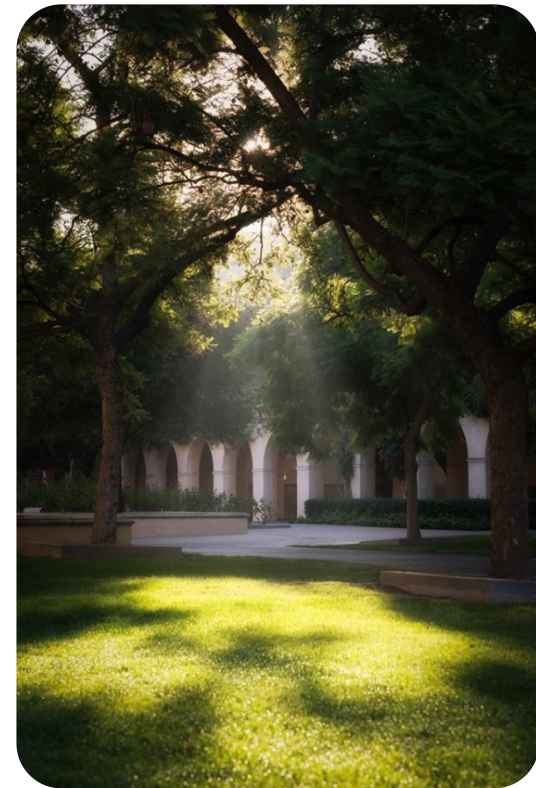
- **Huge impact**

- 40+ Nobel prizes
- 70+ National Medals of Science/Tech.
- 130+ faculty in National Academies
- 150+ patents each year
- Top 10 in most university ratings (sometimes #1)



Caltech's Structure

- **Biology and Biological Engineering**
- **Chemistry and Chemical Engineering**
- **Engineering & Applied Science**
 - Aerospace (Ae)
 - Applied Physics & Material Science (APh|MS)
 - Computing & Mathematical Sciences (CMS)
 - Electrical Engineering (EE)
 - Environmental Science & Engineering (ESE)
 - **Mechanical & Civil Engineering (MCE)**
 - Medical Engineering (MedE)
- **Geological & Planetary Sciences**
- **Humanities & Social Sciences**
- **Physics, Mathematics & Astronomy**



Mechanical and Civil Engineering

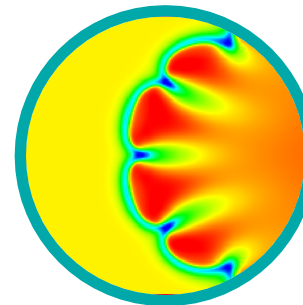
- **Mission: Create sustainable, autonomous, and resilient machines and infrastructure**

- Advance fundamental research
- Address pressing societal challenges
- Attract the best people
- Provide an inspiring atmosphere for research and education
- Increase and promote diversity

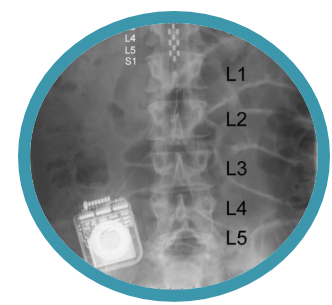
- **Broad disciplinary areas**

- Thermo-fluids
- Solids, structures, and materials
- Robotics, controls and systems

Major issues driving current research



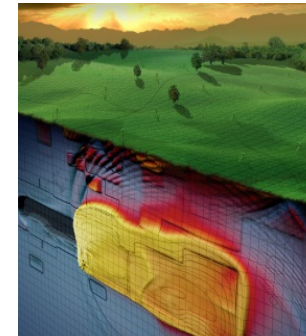
Energy



Medical devices



Novel materials



Resilience to hazards



Robots and mobility

Interdisciplinary Faculty



Computing +
Mathematical
Sciences

KISS

Biomedical
Engineering



CSN



THOR



Geology and
Planetary
Sciences



mce



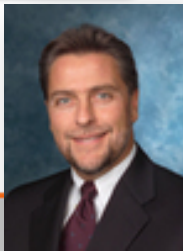
Applied Physics
and Materials
Science



Resnick



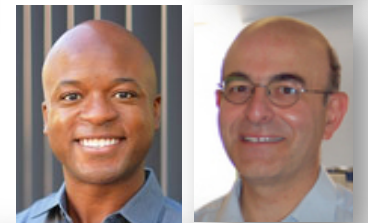
JCAP



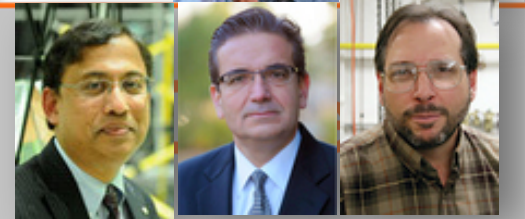
Chemistry and
Chemical
Engineering

JPL

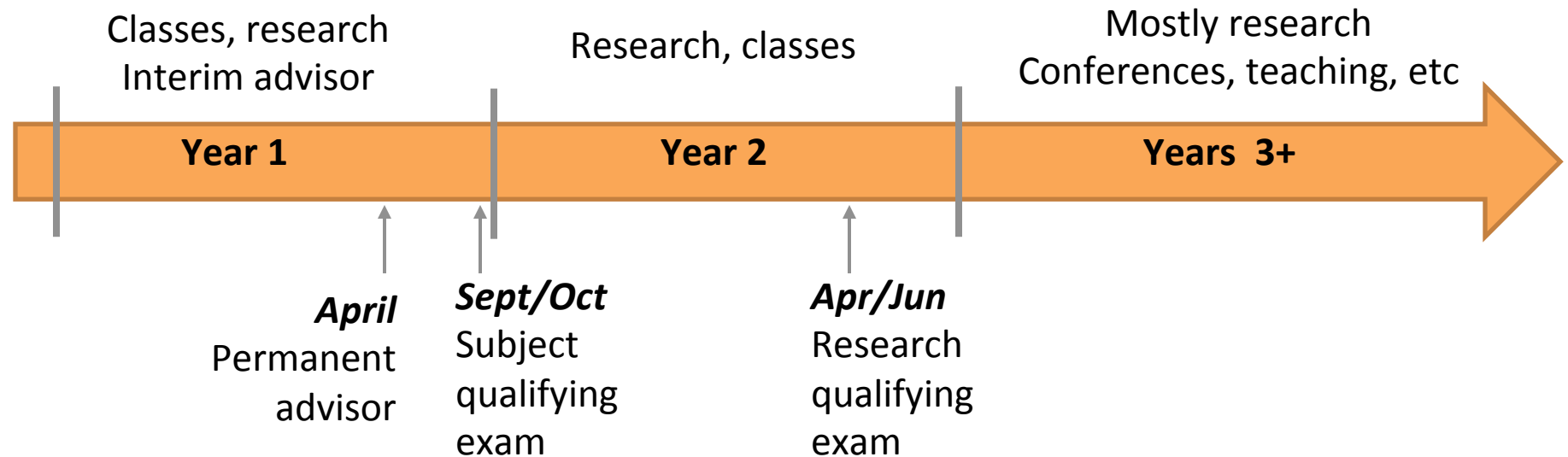
GALCIT



mce



PhD Study at MCE



- **Can get Masters of Science along the way (course requirement only)**
- **Full financial support for the duration of PhD studies**
 - Year 1: Fellowship
 - Years 2+: Research funds; occasional teaching
 - Outside funding strongly encouraged

Ph.D. Coursework – 195 Units

27 units = academic-year-long course sequence (Sep-May)

Advanced Math (27 units)

Core subjects (54 units for ME, 45 for AM/CE)

List of specific courses

Electives/Minor (54 units for ME, 63 for AM/CE):

Additional engineering or science courses with course number 101 or above.

Graduate Seminars (6 units)

Research (54 required units)

Potential advisors: MCE +



Computing +
Mathematical
Sciences

KISS

Biomedical
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CSN



THOR



Geology and
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mce



Applied Physics
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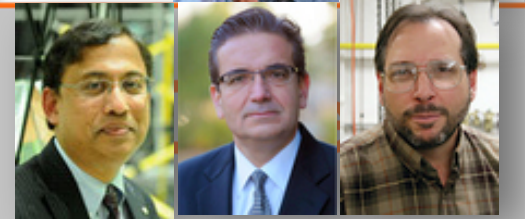
Chemistry and
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Engineering

JPL

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mce



Advisor

- **Interim advisor for first ~ 7 months**
- **Permanent advisor by April of year 1**
 - Talk to grad students
 - Visit labs
 - Meet with prospective advisors
 - Attend weekly SOPS presentations
 - Ask to join group meetings
 - Take some research units during your first year
- **What to look for?**
 - Aim for the area of general interest
 - Good personality match rather than specific projects



Other Opportunities

- **Best time to learn**
 - Get a minor
 - Take additional classes
- **Teaching**
 - TA a class to learn more
 - Center for Teaching, Learning, and Outreach (CTLO)
 - Caltech Project for Effective Teaching (CPET)
- **Summer detached duty and internships**
 - DOE national laboratories
 - Air Force Research Laboratory
 - Jet Propulsion Laboratory



Extra Curricular

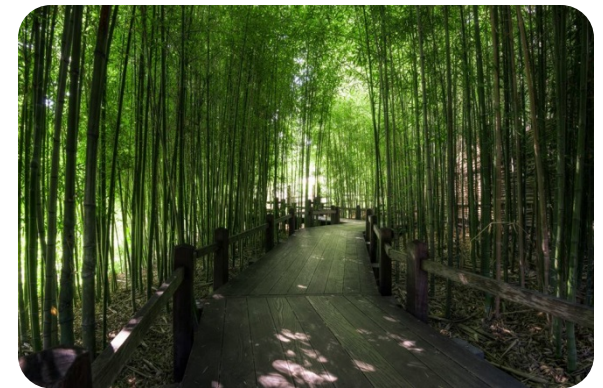
- **Events, Music, Art and Theater**
 - Presentations, performances, public lectures
 - Instrumental and vocal ensembles, theater arts
 - Ceramics, Painting, Drawing, Silk Screening
 - Courses in all areas
- **Caltech Braun Athletic Center**
 - Free student membership
 - Club sport teams
 - Exercise equipment
 - Group fitness classes
 - Aquatic programs
 - Climbing Wall



Beyond Research

- **Caltech Center for Diversity (CCD)**
 - Policy and programming to support student access, equity and inclusion
 - Resources for women, underrepresented groups, LGBTQ
- **Diversity, Equity, and Inclusion in MCE**
 - <https://mce.caltech.edu/dei>
 - Student-initiated effort on MCE climate
 - MCE DEI Liaison (currently Holly Golcher)
 - DEI seminars during MCE coffee hour
 - Women in MCE
- **Caltech Y**

Aims to enrich student life and challenge students to grow into responsible citizens of the world.



Get Involved

- **SOPS – Society of Professional Students (MCE)**

- Weekly Graduate **Research Seminar**
- Weekly Gates-Thomas **Coffee Hour**
- Monthly Gates-Thomas **Social Hour**
- Annual Fall **BBQ**
- Biennial Spring **Banquet**
- **Advocacy for issues important to students**



- **Graduate Student Council (Caltech-wide)**

- Maximize the quality of life for the graduate students in many areas:
 - Steering committee
 - Publications
 - Academics
 - Advocacy
 - Social – field trips and sports teams



<http://www.its.caltech.edu/~sops/>

Honor Code

- **Philosophy**

Creative work requires that one be free to think, communicate, and exchange ideas with others. Creativity flourishes in an atmosphere of trust and respect.

- **By joining Caltech, we agree to accept the Honor Code.**



No member of the Caltech community shall take unfair advantage of any other member of the Caltech community.

You can find everything in LA

World class museums, landmarks and sports



Getty Villa & Getty Center Los Angeles



Dodgers game & Malibu



Griffith Observatory, Hollywood Hills & Santa Monica Pier



And the surrounding area



San Gabriel Mountains (biking)



Sierra Nevada Mountains (skiing)



San Bernardino Mountains (hiking)



Malibu (relaxing)



Palm Springs (triathlon)



San Francisco Bay (boating)



Desert (sleeping)

Or further, for the weekend

Places to go, People to meet, Sights to see

Yosemite – 6 hours away



Giant Sequoia Redwoods – 5 hours away



**Zion National Park
– 6 hours away**



Death Valley – 5 hour away

Joshua Tree – 2.5 hours away



Places to rest and relax

The Huntington, San Marino



Turtle Pond, Caltech



**Switzer Falls,
San Gabriel Mtns.**

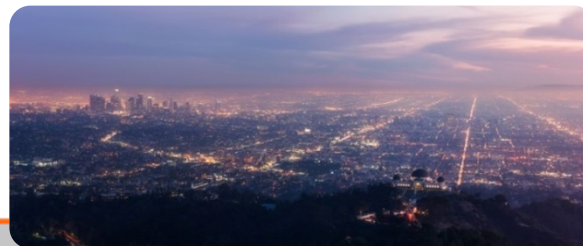


**Universal Studios,
Universal City**



Desert

View of Los Angeles



Point Dume, Malibu

photos provided by MCE Grad. Students



Questions?



Mechanical and Civil Engineering

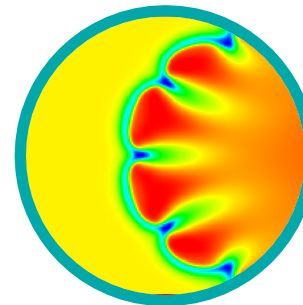
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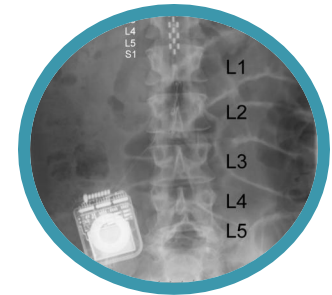
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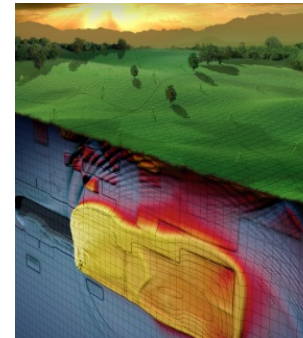
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Medical devices



Novel materials



Resilience to hazards



Robots and mobility