Mechanical & Aerospace Engineering Department

Tsu-Chin Tsao
Professor and Department Chair
Department Mission Statement

• Our mission is to educate the nation's future leaders in the science and art of mechanical and aerospace engineering. Further, we seek to expand the frontiers of engineering science and to encourage technological innovation while fostering academic excellence and scholarly learning in a collegial environment.
Faculty

Ladder Faculty: 34

Recognitions
Society Fellows: 29
CAREER or Young Investigator Awards: 10
NAE members: 7

Faculty Research Areas
- Dynamics, Systems and Controls
- Fluids, Heat/Mass Transfer
- Structure & Solid Mechanics
- Manufacturing & Design
- Micro and NanoTechnology
- Plasma Physics, Applied Mathematics

Fiscal Year 2013-2014 Sponsored Research Budget - Total $23.2M
(Fiscal Year 2013-2014 Sponsored Research Expenditures - Total $10.8M)

Federal $14.16M (61%)
University & Endowments $4.09M (18%)
Industry $4.40M (19%)
Spoke $1.53M (2%)

Research Centers
- CESTAR: Center for Energy Science and Technology Advanced Research (Abdou)
- FSTC: Fusion Science and Technology Center (Abdou)
- SMERC: Smart Grid Energy Research Center (Gadh)
- SYDUC: Systems, Dynamics and Controls (Gibson, M'Closkey)
- TANMS: Center for Translational Applications of Nanoscale Multiferroic Systems (Carman)
- WINMEC: Wireless Internet for Mobile Enterprise Consortium (Gadh)
Student Enrollment

Undergraduate Freshman Admission Statistics
Applications: Mechanical 2384 / Aerospace 1079 / Total 3463
Admits: Mechanical 306 / Aerospace 139 / Total 445
Admit Rate: Mechanical 12.8% / Aerospace 12.9%
Positive SIR: Mechanical 70 / Aerospace 42 / Total 112
Enrolled: Mechanical 68 / Aerospace 41 / Total 109

Undergraduate Transfer Admission Statistics
Applications: Mechanical 440 / Aerospace 115 / Total 555
Admits: Mechanical 34 / Aerospace 18 / Total 52
Admit Rate: Mechanical 7.7% / Aerospace 15.7%
Positive SIR: Mechanical 8 / Aerospace 12 / Total 20
Enrolled: Mechanical 8 / Aerospace 12 / Total 20

Fall Quarter 2013
Undergraduate Enrollment
Mechanical 389
Aerospace 180
Total 569

Graduate Admission Statistics

<table>
<thead>
<tr>
<th>Applicants</th>
<th>Admits</th>
<th>Enrolled</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Domestic</td>
<td>Foreign</td>
</tr>
<tr>
<td>Mechanical</td>
<td>198</td>
<td>128</td>
</tr>
<tr>
<td>Aerospace</td>
<td>82</td>
<td>59</td>
</tr>
<tr>
<td>Total</td>
<td>280</td>
<td>187</td>
</tr>
</tbody>
</table>

Number of ME & AE degrees conferred 2013-14 (BS, MS, PhD)

- BS Mechanical: 111
- BS Aerospace: 40
- Total: 151
- MS Mechanical: 68
- MS Aerospace: 17
- Total: 85
- PhD Mechanical: 27
- PhD Aerospace: 4
- Total: 31

ME & AE Degrees Conferred 2013-14

- BS ME: 110, AE: 11
- MS ME: 65, AE: 12
- PhD ME: 27, AE: 4
Department Ranking

US News & World Report Graduate Rankings

Faculty Head Count

AE
ME
ENG

Faculty Head Count
## MS Online Ranking

<table>
<thead>
<tr>
<th>Rank</th>
<th>School</th>
<th>Faculty Credentials and Training</th>
<th>Student Services and Technology</th>
<th>Student Engagement</th>
<th>Admissions Selectivity</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1</td>
<td>University of California—Los Angeles (Samueli) Los Angeles, CA</td>
<td>98</td>
<td>100</td>
<td>94</td>
<td>99</td>
</tr>
<tr>
<td>#2</td>
<td>Columbia University (Fu Foundation) New York, NY</td>
<td>94</td>
<td>60</td>
<td>100</td>
<td>100</td>
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<tr>
<td>#3</td>
<td>University of Southern California (Viterbi) Los Angeles, CA</td>
<td>84</td>
<td>56</td>
<td>78</td>
<td>95</td>
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<tr>
<td>#4</td>
<td>Purdue University—West Lafayette West Lafayette, IN</td>
<td>90</td>
<td>90</td>
<td>48</td>
<td>67</td>
</tr>
<tr>
<td>#5</td>
<td>Pennsylvania State University—World Campus University Park, PA</td>
<td>89</td>
<td>56</td>
<td>78</td>
<td>39</td>
</tr>
</tbody>
</table>
Sponsored Research Budget & Expenditure

Amounts in Millions

Federal
Endowment
Industry
State
Total Budget
Expenditure

Suggested Discussion Topics for IAB

- Improve curricula
  - reduce graduation units from AE-187 and ME-185 to 180

- Student Design and Prototype Studio
Alumni Advisory Board

Chair of the Board (Volunteer): Dr. William Goodin
Industry Advisory Board

Chair of the Board (Volunteer): Dr. William Goodin
Industrial Partnerships

• Industrial Affiliates
  – Alcoa (joined last year)
  – Aerojet Roketdyne
  – Boeing
  – Chevron
  – Exxon Mobil
  – Honeywell Engines, Systems & Services
  – Lockheed Martin
  – National Instruments
  – Northrop Grumman Aerospace Systems
  – Phillips 66
  – Raytheon
Alumni Advisory Board

Chair of the Board (Volunteer): Dr. Wayne Goodman

Industrial Advisory Board: January 23, 2014

UCLA HSSEAS Student Creativity Center

UCLA HSSEAS Student Creativity Center
Faculty Recruitment

• New hires:
  – Jonathan Hopkins (design, July 2012),
  – Xiaochun Li, Raytheon Chair in Manufacturing Engineering (August 2013)
  – Dennis Hong (robotics, Jan. 2014),
  – Jacob Rosen (robotics, July 2014),
  – Veronica Santos (robotics, July 2014),
  – Yongjie Hu (Heat & Mass Transfer/Nano, July 2014)

• This year’s recruitment plan:
  – Aerospace Engineering
  – Distributed Transductions for Mechanical Systems
Initiative on Robotics

• Robotics education and research programs
  – Cluster faculty hires: Hong, Rosen, Santos
  – New UG and G courses
  – Interdisciplinary projects with other fields
  – Collaboration with medical school, NASA JPL, local industry, etc.
Student Design Competitions

MAE 94 Computer Aided Design (CAD) and Drafting/Rapid Prototyping
Student Design Competitions

- MAE 157A Fluid Mechanics and Aerospace Laboratory: Capstone Aerospace Design Course
Student Design Competitions

• MAE 162D/E Capstone Mechanical Design Course

Picture of all 21 autonomous material transporters designed and built by students of the 2014 MAE-162D/E Capstone Design Course (UCLA)

Class photo of the 2014 MAE-162D/E (UCLA) Capstone Design Course.
Design-to-Prototype Curricula Trajectory

- Freshman: School-wide introductory class
- Sophomore: CAD/design prototyping (94)
- Junior: Basic ME&AE Lab. (157/157S)
- Senior: Capstone design and Competition
  - ME: 162D/162E,
  - AE: 157A
Student Group Projects
Our Goal is to create **Student Design And Prototyping Studio** to support and strengthen
- our curricula from design to prototype realization
- student led projects: AIAA, ASME, BEAM (high school outreach), Robotics, SAE.
- innovative students and faculty projects

Our Needs
- CNC machining and laser cutting machine tools
- 3D printers for various materials
- Mechatronics Kits (sensors, actuators, controllers)
- Coordinate Measurement Machines
Innovative Design & Prototyping Studio

• Our Plan and Progress
  – We have faculty experts in design and manufacturing: Professors Hong, Hopkins, Ghoniem, Li, Santos, Shaefer, Rosen, Tsao
  – We are soliciting industrial partners and donation of tools and equipment we need
    • 100 units National Instruments myRIO for 162D/E
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Thank You!