

UCLA Engineering

Mechanical and Aerospace Engineering

Welcome to MAE Open House 2017!

Ajit Mal

Vice Chair for Undergraduate Affairs

- Overview of academic program (Mal)
- Q&A session with alumni/student panel

- Provide undergraduate students with a sound knowledge of the fundamentals essential for success in graduate school or industry.
- Provide an appropriate balance of theory, design, laboratory, and research experience.
- Develop strong skills in written and oral communication.
- Provide an educational base on which to build a habit of lifelong learning.
- Instill a sense of the importance of professional integrity and public service.

Our graduates should be successful in

- Careers in industry.
- Graduate studies.
- Moving to other professional fields.

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- Efficient wind turbines
 - Robots (soccer player, assist in rescue operations)
 - Artificial heart valves
 - Fusion energy
 - Ion propulsion for space exploration
 - Solar thermal energy storage
 - Efficient aircraft propulsion
 - Waste heat energy harvesting
 - Single cell “surgery”
 - Smart structures (that can self diagnose and self repair)

Close connection between MAE and industry leads to internships and permanent positions

Industrial Advisory Board (IAB)

- Aerojet Rocketdyne
- Aerospace Corporation
- Air Force Research Lab
- Arconic (formerly Alcoa)
- Boeing
- CA Dept. of Water Resources
- Chevron
- General Motors
- Honeywell
- HRL Laboratories
- Intel
- Jet Propulsion Laboratory
- Lockheed-Martin
- NASA Dryden Flight Research Center
- National Instruments
- Northrop-Grumman
- Raytheon
- SpaceX

UCLA Engineering

Mechanical and Aerospace Engineering

Collaboration with Alumni

Close connection between MAE and Alumni leads to
Improvements in curricula
Alumni Advisory Board (AAB)

MAE 1, Undergraduate Seminar
Ajit Mal (coordinator)
Fall 2016 Thursdays, 5-7 pm

Brief opening remarks

Week 1: Ajit Mal, Ann Karagozian (V. C. for Research), William Goodin

Guest lecturers (UCLA alumni from industry)

Dave Crawford, Disney Imagineering

Eliza Sheppard, Northrop Grumman

Greg Glenn, Freedom Innovations

Marianne So, Honeywell

Avi Okon, JPL

Eric Wostenberg, Virgin Galactic

Prof. Veronica Santos, UCLA Robotics

Prof. Rajit Gadh, UCLA Smart Grid

Week 10: Presentations from Student Group Reps
Pizza and Soft drinks

Courses

**Capstone Design
(AE 3, ME 2)**

Technical Electives (5)

**Mechanical or Aerospace
Engineering Depth (AE 8, ME 6)**

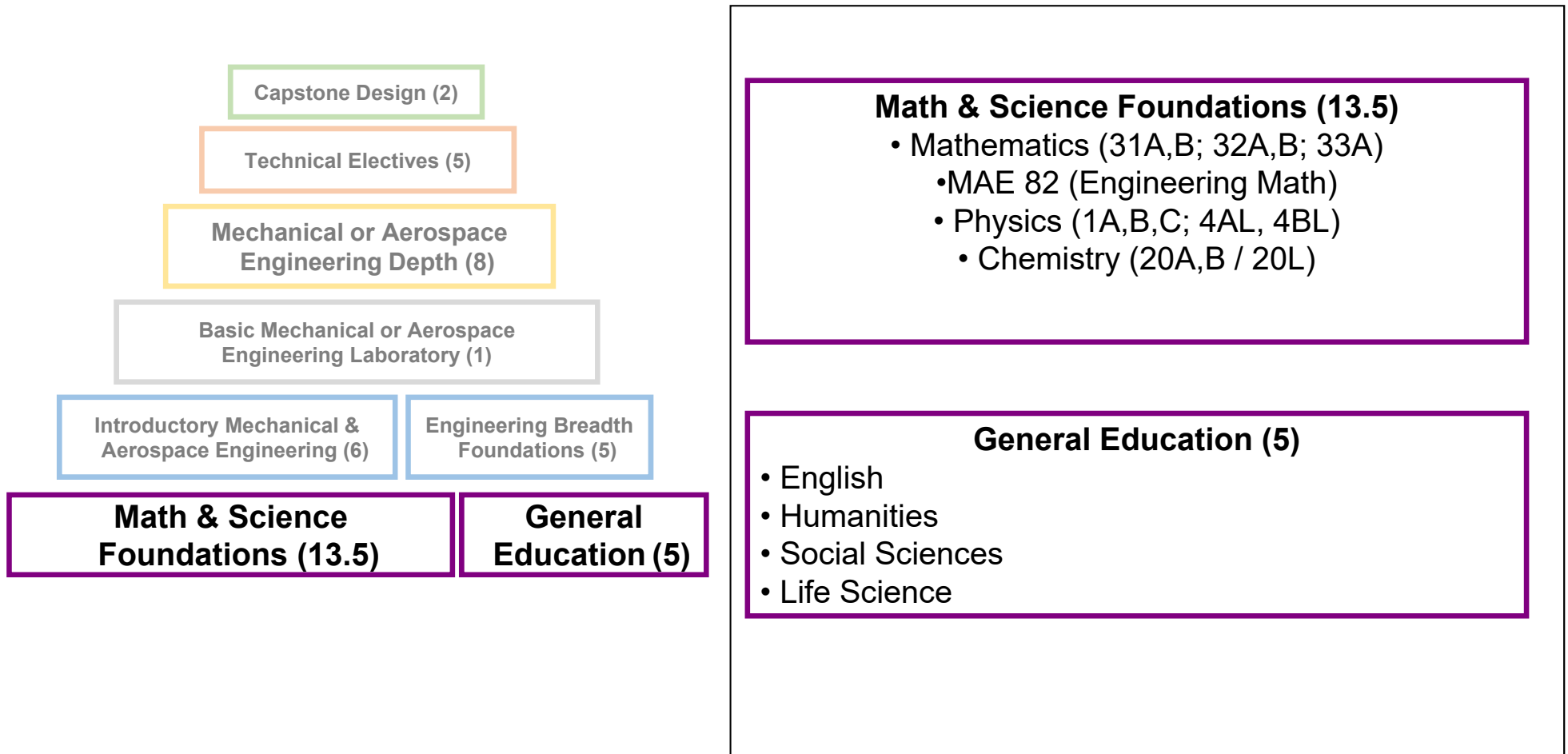
**Basic Mechanical or Aerospace
Engineering Laboratory (1)**

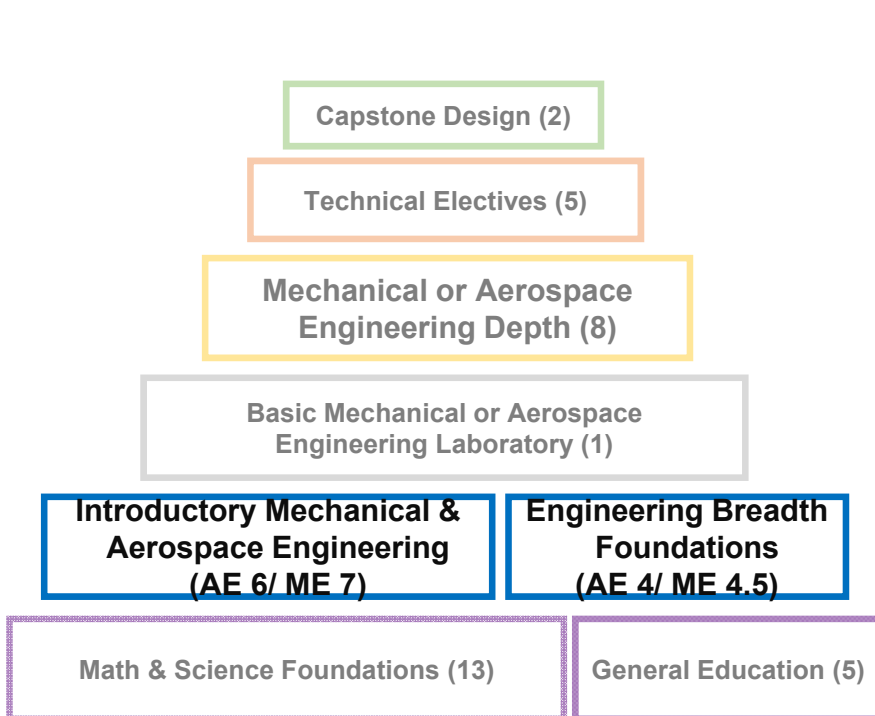
**Introductory Mechanical &
Aerospace Engineering
(AE 5, ME 7)**

**Engineering Breadth
Foundations (AE 4/ME 4.5)**

Math & Science Foundations (13.5)

**General Education
(5)**



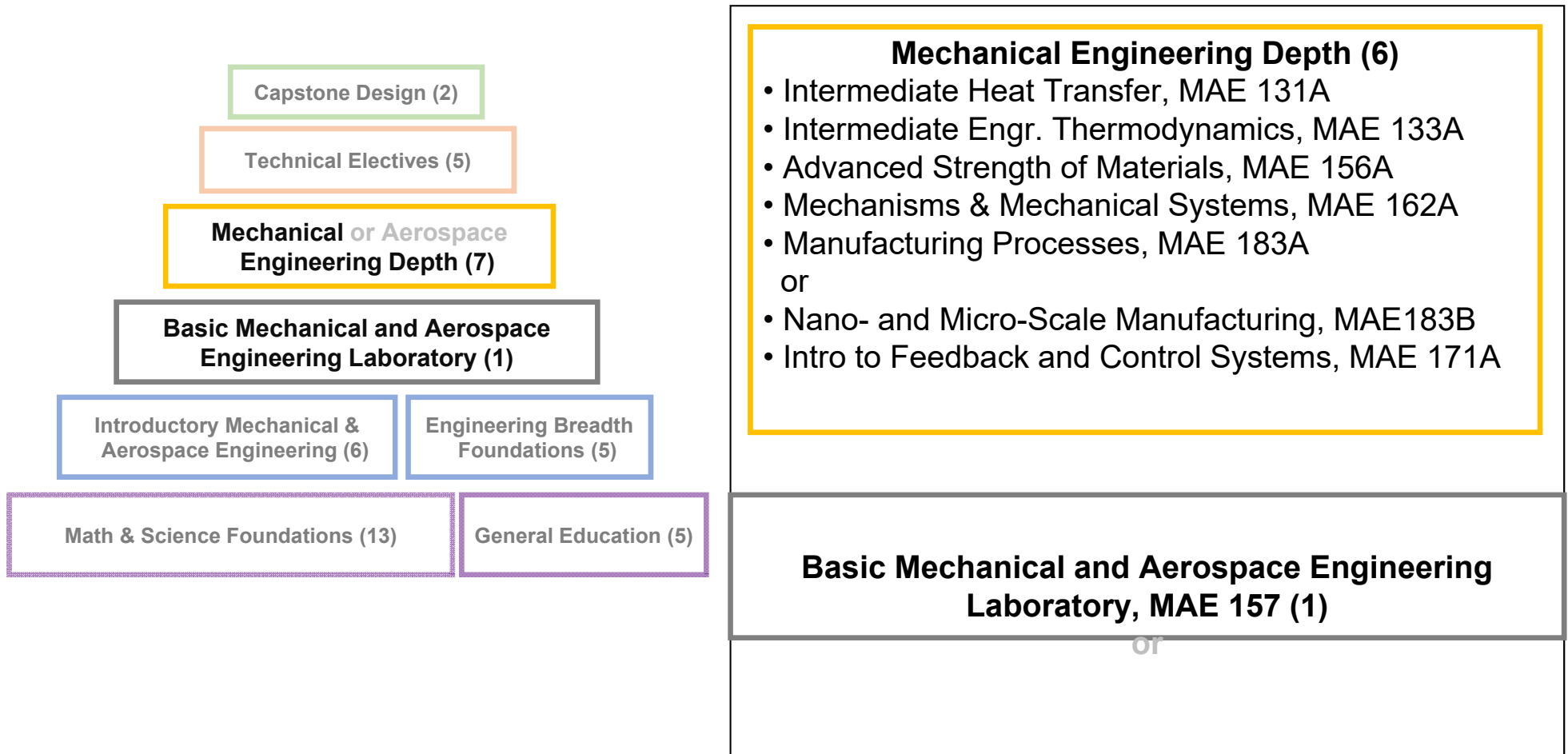


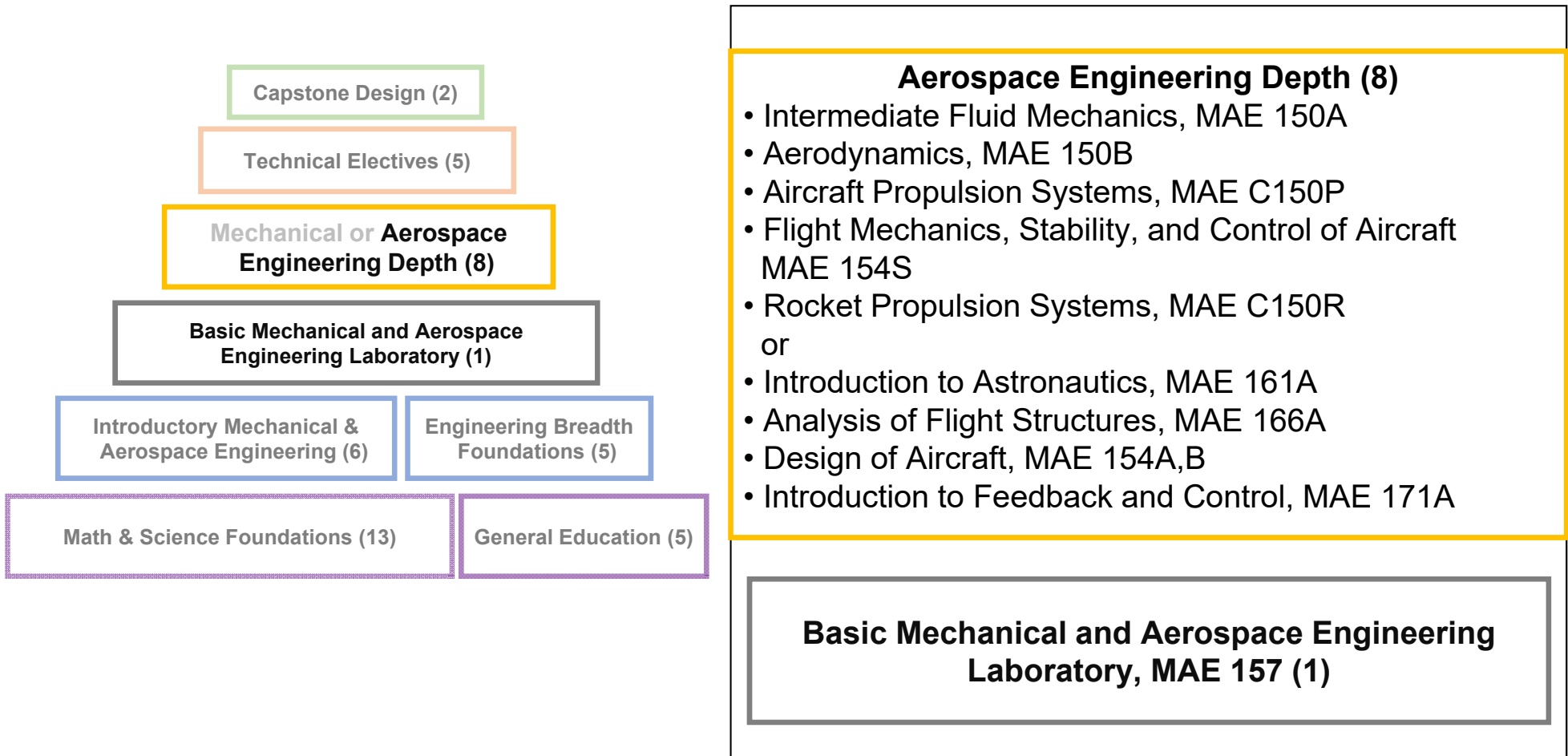
Introductory Mech. & Aero. Engineering (AE 5/ME 7)

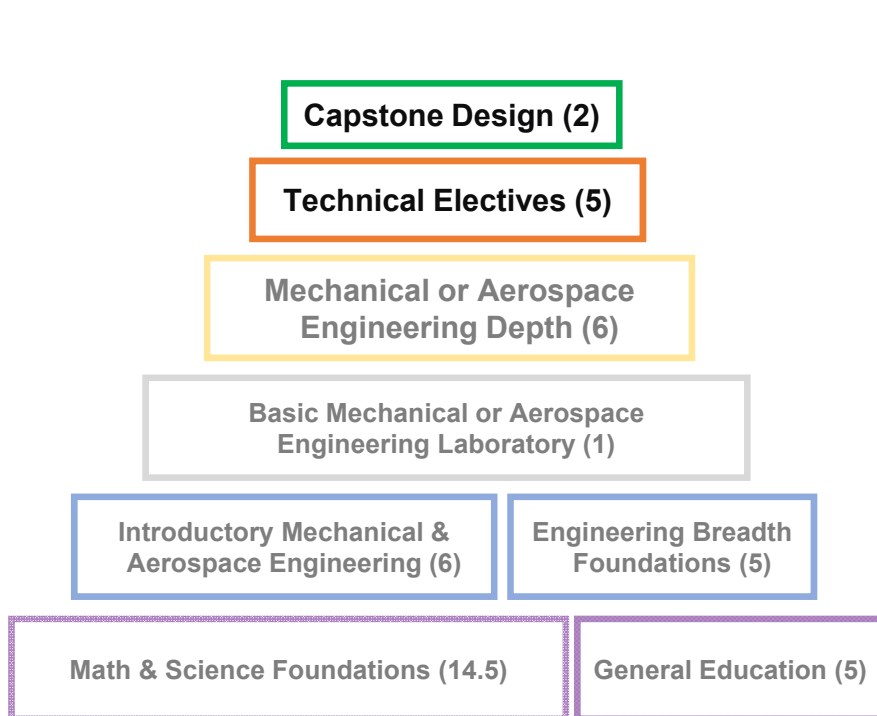
- Intro. to CAD and Drafting, MAE 94 (ME only)
- Statics and Strength of Materials, MAE 101
- Dynamics of Particles and Rigid Bodies, MAE 102
- Elementary Fluid Mechanics, MAE 103
- Intro. to Engineering Thermodynamics, MAE 105A
- Transport Phenomena, MAE 105D (ME only)
- Intro. to Modeling and Analysis of Dynamic Systems, MAE 107

Engineering Breadth Foundations (AE 4, ME 4.5)

- Science of Engineering Materials (MSE104)
- Electrical & Electronic Circuits/Lab (EE 100/110L)
- Introduction to Computer Science, MAE M20
- HSSEAS Ethics Course, 183EW







Technical Electives (5)

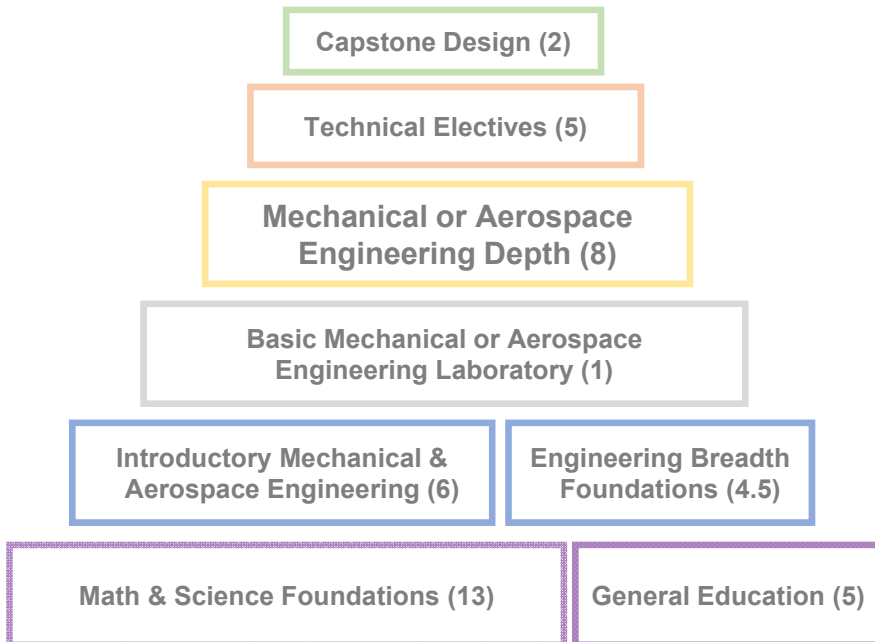
- Two Mechanical or Aerospace Engineering Electives.
- Three Technical Breadth Courses, Outside MAE.

Mechanical Engineering Capstone Design (2)

- Mechanical Engineering Design I, MAE 162D
- [Mechanical Engineering Design II](#), MAE 162E

Aerospace Engineering Capstone Design (3)

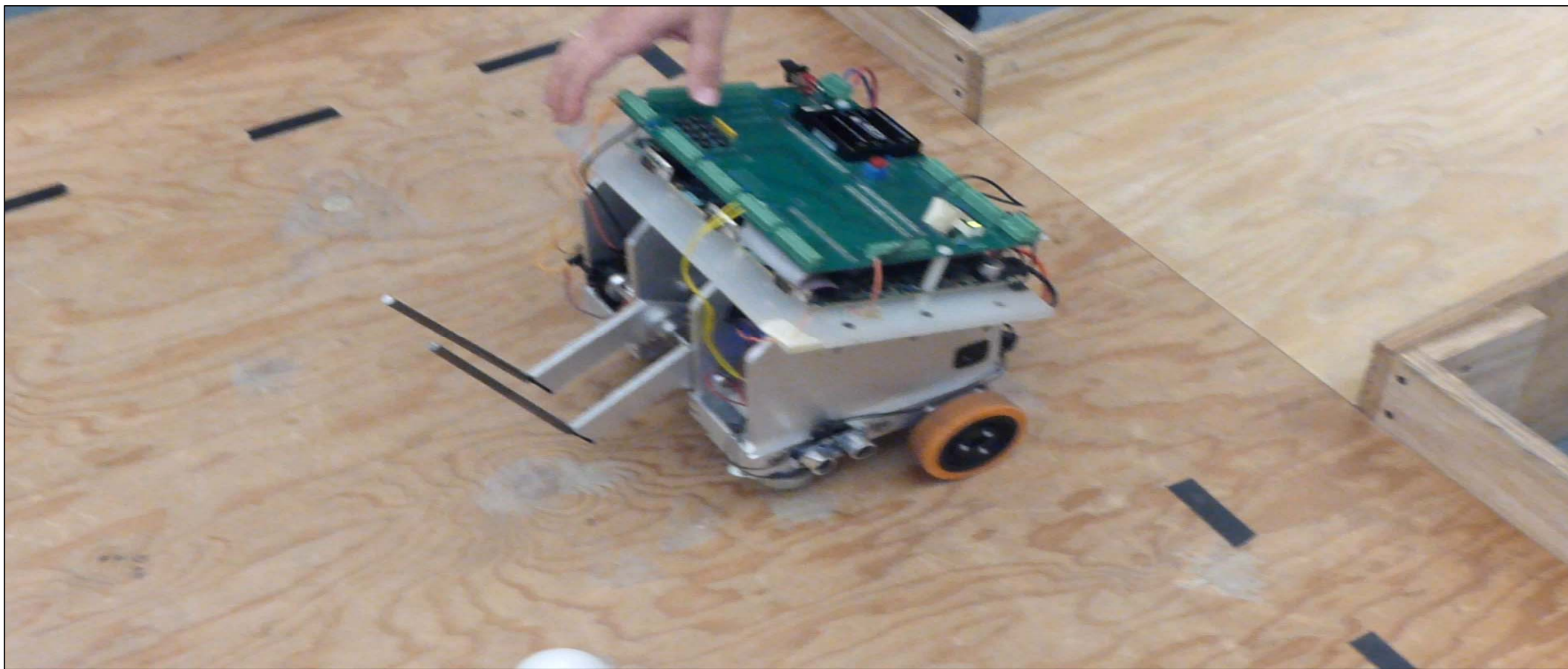
- Preliminary Design of Aircraft, MAE 154A
- Design of Aerospace Structures, MAE 154B
- Fluid Mechanics and Aerodynamics Lab, 157A



ABET accreditation for
AE and ME programs has
recently been granted through
September 2019.

Capstone Projects

Billiard Ball Transporter



BestBrianBallBringer-2014

Capstone Projects

Rice Bag Transporter



For MAE 162D/E (Prof. Hong)

- 1) Vertical climbing propeller driven vehicle
- 2) Butter passing robot arm
- 3) Firefighter robot
- 4) Door opening robot
- 5) Hover board type vehicle using monoball
- 6) White boards eraser
- 7) Moping robot
- 8) Anti missile defense using ping pong ball
- 9) Drain Pipe cleaning robot

R. M. Spearrin, Spring 2017 Computer Lab: 38-138A

Class (No.)	Date	Lecture Topics (general)	Team Project	Labs
1	Tu, 4/4	INTRODUCTION: Design-build-launch (DBL) Rocket Basics (review)	System Requirements Review	Matchbox Rocket
2	Th, 4/6	Trajectory/ Apogee Analysis On-campus lab resources HW: EH&S Lab Safety Certification		Water Rocket
3	Tu, 4/11	History of Rockets and Amateur Rocketry in Southern California DS: Design/FEA SEASnet computing	Team Formation Base Rocket Kit Selection (C-G motor)	Lab #1: Casing CAD/FEA
4	Th, 4/13	No Lecture DS: Composites Fabrication		CAD/FEA fabrication
	Sat, 4/15	SCRA Test Launch (Santa Fe Dam)	Base Kit Launch	
5	Tu, 4/18	Guest Lecture: Brian Anderson (CFD) Aerodynamic Drag Airfoils Method of Characteristics		Lab #2: Fins CAD/ CFD
6	Th, 4/20	No Lecture DS: 3D Printing, Bonding (to casing)		CAD/CFD fabrication
7	Tu, 4/25	Wind Tunnel Operation (Ben Tan) Center of Pressure, Gravity Transverse Loads		Wind Tunnel Testing
8	Th, 4/27	Machining/Fabrication Techniques HW: Machine Shop Safety		Lab #3: Nosecones CAD/CFD/FEA
	Sun, 4/30	SCRA Test Launch (Santa Fe Dam)	Base Kit Launch	
9	Tu, 5/2	No Lecture Team Presentations	PDR	CAD/CFD/FEA 3D printing

Other undergraduate activities

- Town Hall meetings with undergraduates held each Spring
- MAE Scholars program for incoming freshmen
- Annual MAE Career Fair– organized by UG Student Council
- Student Cubs
- MAE 1: Undergraduate Seminar Course

Active Student Clubs Hands-on Activities

- American Society of Mechanical Engineers
 - Battlebots, Unmanned Underwater Vehicle
- American Institute for Aeronautics and Astronautics
 - Design-Build-Fly, Rocket Project, Unmanned Aerial Systems
- Society of Automotive Engineers
 - Baja, Supermileage, Formula
- UCLA Robotics
- CubeSat
- BEAM Outreach
- Schoolwide Societies (SWE, NSBE, SOLES, Tau Beta Pi, EWB, and more)

Vibrant Student Communities and Projects

Student projects get strong support from Industrial Advisory Board and Alumni Advisory Board



- UCLA SAE Supermileage



- UCLA SAE Baja



- UCLA BEAM

- UCLA AIAA [Design-Build-Fly](#)

- UCLA ASME Robotics

- UCLA Rocket Team

- UCLA SAE Formula One



UCLA Engineering

Mechanical and Aerospace Engineering

Facts and Figures

Enrollment Data

Aerospace Engineering

SIR - 55

Enrolled - 52

Mean GPA (weighted) - 4.538

Mean GPA (unweighted) - 3.962

Mean SAT Math - 748.4

Mean SAT Reading - 700.1

Mean SAT Writing - 704.3

Mean SAT Total - 2150.6

Mean SAT Math II - 761.7

Mechanical Engineering

SIR - 88

Enrolled - 85

Mean GPA (weighted) - 4.486

Mean GPA (unweighted) - 3.971

Mean SAT Math - 761.2

Mean SAT Reading - 715.7

Mean SAT Writing - 721.8

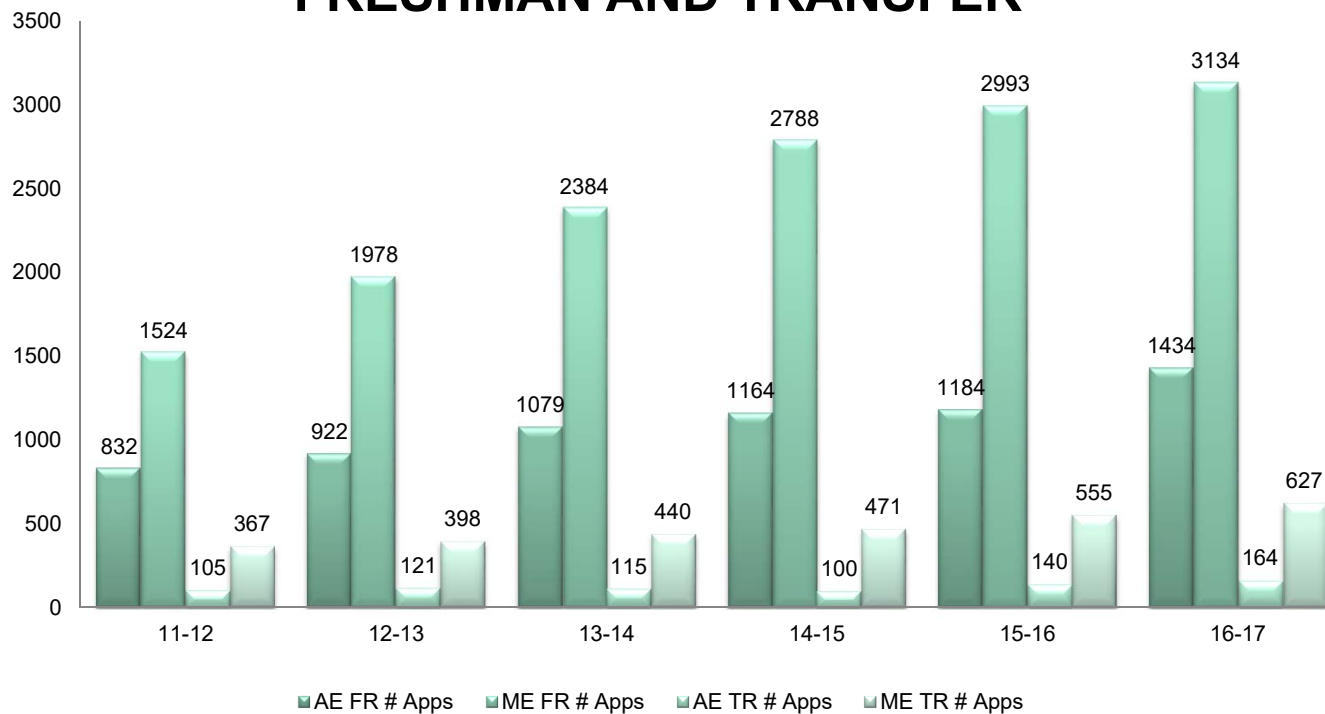
Mean SAT Total - 2197.9

Mean SAT Math II - 775.5

All Applications



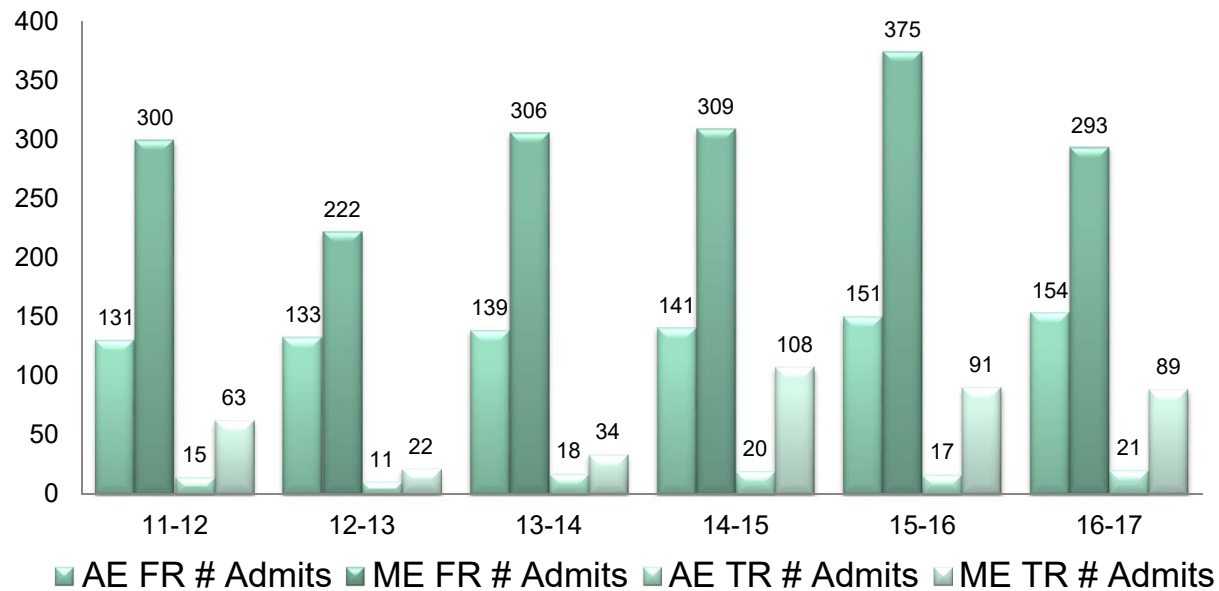
B.S. APPLICATIONS FOR AE AND ME FRESHMAN AND TRANSFER



All Admits



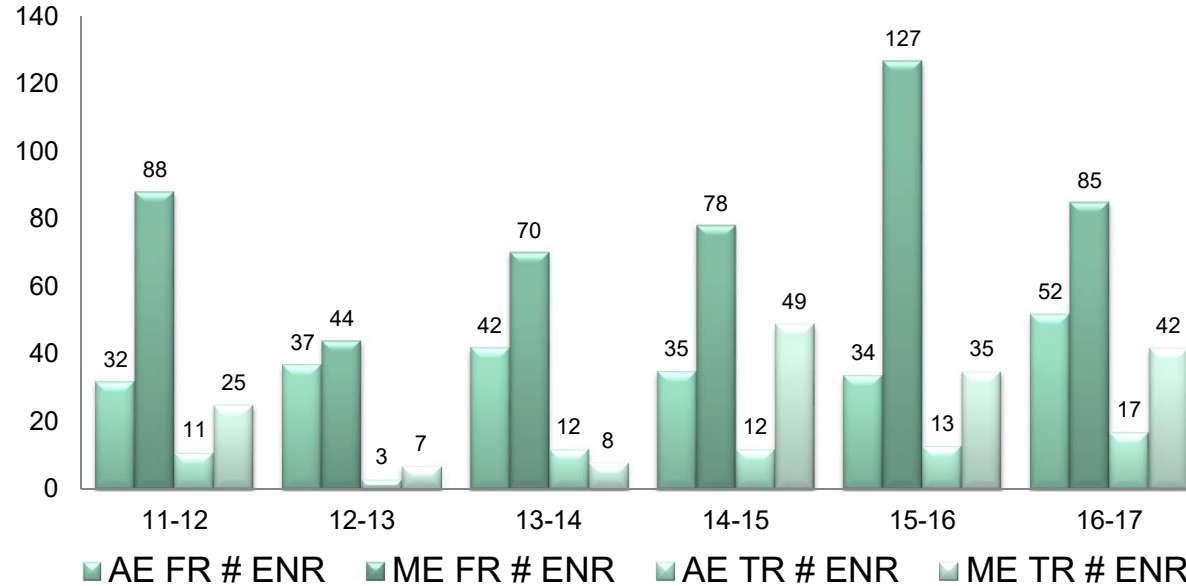
B.S. ADMITS FOR AE AND ME FRESHMAN AND TRANSFER



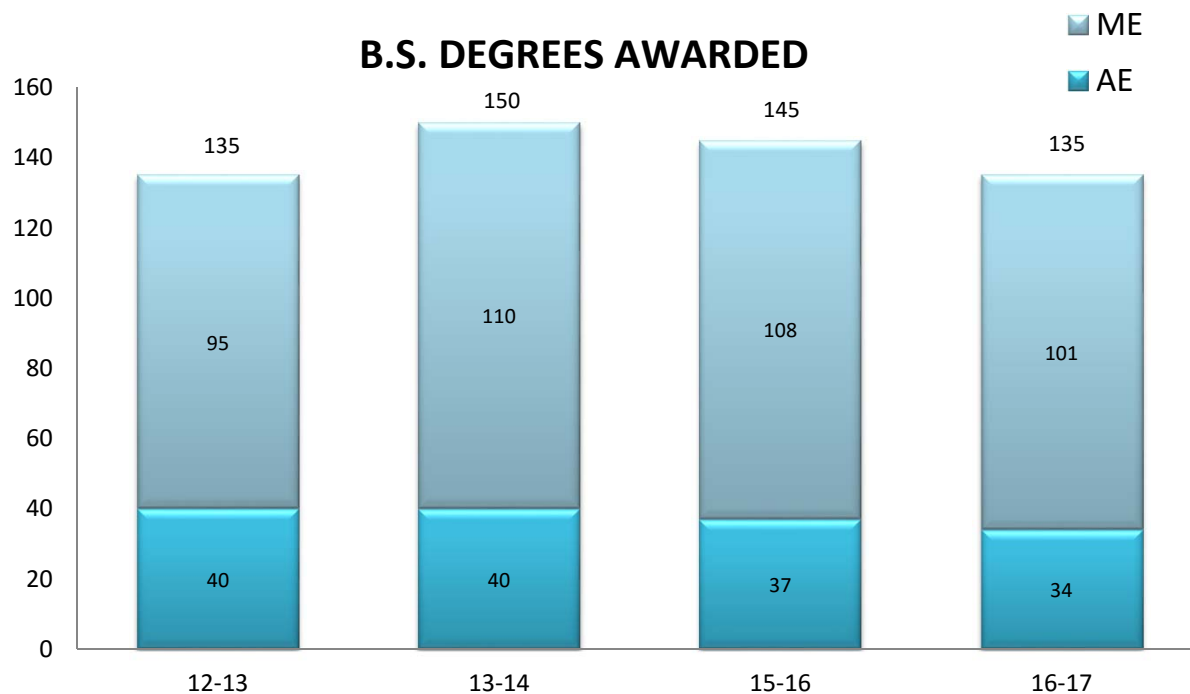
All Enrollments (2016-17: ME-127, AE 69)



B.S. NEW ENROLLMENTS FOR AE AND ME FRESHMAN AND TRANSFER



B.S. Degrees Awarded



- For students entering HSSEAS as freshmen between F2005-F2011, between 74-80% have either earned their degree or were still enrolled at HSSEAS by the beginning of the 13th quarter (year 5)
- Of the students not enrolled at HSSEAS, many of them changed majors to Letters & Science and have either graduated or are still enrolled as UCLA students outside of HSSEAS.
- Historically, less than 10% of students admitted to HSSEAS as freshmen completely leave UCLA.

Mechanical Engineering ABET/CSAB Exit Survey
For HSSEAS Graduating Seniors
Fill Ratio 44.8% (69/154)

What are you going to do after graduation?

16 out of 69 (23.2%) didn't know.

Of those who knew:

Work in industry related to engineering	32 (60.4%)
Attend graduate school in engineering	18 (34.0%)
Other	1 (5.6%)

Now	A few questions for me...	Here
Until ~12:30 pm	MAE Alumni and Student Panel	Here
12:30 – 1:30 pm	Lunch and Meet & Greet (Faculty, Alumni, Student Groups)	Young Hall Courtyard
1:30 – 3:30 pm	<ul style="list-style-type: none"> • UCLA Engineering Ambassador Tours - Starting point is at the front of Boelter Hall, near the Student Group Fair • Engineering Student Organizations Fair in the Court of Sciences • SEASnet Computer Labs - Boelter Hall rooms 2684, 4404, 4405, and 4442 	
3:00 – 3:30 pm	Housing Tour – Meet at the Bruin Bear	

Panel Members

Jean-Luc Chamaa	NAVAIR	Engineer	2016
Anthony Gambardella	SpaceX	Lead Manufacturing Engineer	2012
Sherwin Goo	Jet Propulsion Laboratory	Aerospace Engineer	1987
Nikki Kodama	Northrop Grumman	Manager of Systems Engr.	2001
Anny Lin	Northrop Grumman	Systems Engineer	2016
Kai Matsuka	Jet Propulsion Laboratory	Guidance & Control Engineer	2016
Steffen Tai	UCLA	Ph.D. Student	2014
Anthony Vong	Northrop Grumman	Systems Engineer	2016
James Sharp	Northrop Grumman	Systems Integration	2016
Tara Kawai-Daniels	UCLA	Senior	
Sean Oh	UCLA	Senior	
Kelsey Sakamoto	UCLA	Senior	
Abhishek Desai	UCLA	Junior	

THANK YOU!

Undergraduate Enrollment Additional Data

Undergraduate Enrollment

MAE Total: 730

Fall Quarter Enrollment

Undergraduate Enrollment	2014	2015	2016
Aerospace Engineering	176	180	195
Bioengineering	268	270	270
Chemical Engineering	311	332	321
Civil Engineering	310	289	302
Computer Science	486	563	667
Computer Science & Engineering	242	300	331
Electrical Engineering	684	565	604
Materials Engineering	127	115	127
Mechanical Engineering	414	494	535
Undeclared Engineering	143	130	128
<i>Total Undergraduate Enrollment</i>	3161	3238	3480
<i>UCLA Campus Undergraduate Total</i>	29,633	29,585	30,873
<i>UCLA Campus Total</i>	43,239	43,301	43,548

Undergraduate Freshman Admissions

MAE Total: 137

Undergraduate Freshman Admission Statistics	Applications	Admits	Admit Rate	Positive SIR	Enrolled
2016-2017					
Aerospace Engineering	1,442	154	10.7%	55	52
Bioengineering	2,228	288	12.9%	66	62
Chemical Engineering	1332	227	17.0%	68	93
Civil Engineering	1450	220	15.2%	84	62
Computer Science	5251	543	10.3%	115	81
Computer Science & Engineering	3320	364	11.0%	100	107
Electrical Engineering	1480	327	22.1%	121	121
Materials Engineering	407	124	30.5%	43	40
Mechanical Engineering	2993	293	9.8%	87	85
Undeclared Engineering	3122	271	8.7%	71	71
Total	23,025	2811	12.2%	810	774
2015-2016					
Aerospace Engineering	1184	151	12.8%	40	34
Bioengineering	2166	299	13.8%	64	61
Chemical Engineering	1386	248	17.9%	66	63
Civil Engineering	1571	229	14.6%	71	66
Computer Science	4219	507	12.0%	110	98
Computer Science & Engineering	3022	450	14.9%	118	102
Electrical Engineering	1337	265	19.8%	100	88
Materials Engineering	328	96	29.3%	26	24
Mechanical Engineering	2993	375	12.5%	143	127
Undeclared Engineering	3122	295	9.4%	81	70
Total	21328	2915	13.7%	819	733

Transfers

MAE Total: 59

Undergraduate Transfer Admission Statistics	Applications	Admits	Admit Rate	Positive SIR	Enrolled
2016-2017					
Aerospace Engineering	164	21	12.8%	14	17
Bioengineering	177	22	12.4%	16	13
Chemical Engineering	281	41	14.6%	13	12
Civil Engineering	253	41	16.2%	19	16
Computer Science	1110	59	5.3%	33	32
Computer Science & Engineering	355	51	14.4%	29	25
Electrical Engineering	455	129	28.4%	80	82
Materials Engineering	76	9	11.8%	1	1
Mechanical Engineering	627	89	14.2%	41	42
Total	3498	462	13.2%	246	240
2015-2016					
Aerospace Engineering	140	17	12.1%	14	13
Bioengineering	172	9	5.2%	0	0
Chemical Engineering	252	32	12.7%	20	18
Civil Engineering	243	33	13.6%	16	16
Computer Science	836	31	3.7%	13	13
Computer Science & Engineering	315	35	11.1%	17	17
Electrical Engineering	405	65	16.0%	34	33
Materials Engineering	53	11	20.8%	7	6
Mechanical Engineering	555	91	16.4%	37	35
Total	2971	324	10.9%	158	151

Undergraduate Enrollment

Gender Breakdown by Major

B.S. Major	Male	Female	Total	Female %
Aerospace Engineering	155	40	195	20.5%
Bioengineering	155	115	270	42.6%
Chemical Engineering	212	109	321	34.0%
Civil Engineering	188	114	302	37.7%
Computer Science & Engineering	532	135	667	20.2%
Computer Science	284	47	331	14.2%
Electrical Engineering	510	94	604	15.6%
Materials Engineering	88	39	127	30.7%
Mechanical Engineering	441	94	535	17.6%
Undeclared Engineering	91	37	128	28.9%
<i>Total</i>	2656	824	3480	23.7%

Average Time to Degree (Excluding Transfers)



Average Elapsed Time-to-Degree for BS Degree Recipients 2010-11 to 2014-15, by Major												
	Number of Graduates					Average Elapsed Years (Qtrs/3)					Avg	
	10-11	11-12	12-13	13-14	14-15	10-11	11-12	12-13	13-14	14-15	3 Years	
Freshmen Access												
Aerospace Engineering	37	44	34	33	31	4.26	4.32	4.46	4.33	4.60	4.46	
Bioengineering	52	47	49	37	49	4.17	4.18	4.20	4.20	4.08	4.16	
Chemical Engineering	79	70	63	84	70	4.07	4.38	4.28	4.22	4.11	4.20	
Civil Engineering	62	62	81	78	74	4.23	4.40	4.32	4.23	4.25	4.27	
Computer Science	56	79	92	124	142	4.23	4.35	4.19	4.20	4.15	4.18	
Computer Science & Engr	36	27	23	28	34	4.14	4.43	4.45	4.15	4.12	4.22	
Electrical Engineering	115	135	112	107	114	4.24	4.48	4.45	4.34	4.28	4.36	
Materials Engineering	10	29	17	27	21	4.10	4.36	4.12	4.30	4.14	4.20	
Mechanical Engineering	95	91	73	94	96	4.46	4.33	4.39	4.21	4.41	4.33	
Total - Freshman Access	542	584	544	612	631	4.24	4.37	4.33	4.24	4.23	4.26	

Average Time to Degree (Transfers)



	Transfer Access to UCLA	Number of Graduates					Average Elapsed Years					Avg
		10-11	11-12	12-13	13-14	14-15	10-11	11-12	12-13	13-14	14-15	3 Years
	Aerospace Engineering	13	10	5	5	4	2.85	3.07	3.00	2.67	2.83	2.83
	Bioengineering	9	6	5	9	8	2.56	2.61	2.93	2.56	2.58	2.65
	Chemical Engineering	21	22	16	15	7	2.68	2.32	2.56	2.62	2.62	2.60
	Civil Engineering	40	24	22	9	8	2.73	2.63	3.09	2.63	2.75	2.91
	Computer Science	17	14	27	14	13	2.80	3.14	3.23	2.86	3.10	3.10
	Computer Science & Engineering	16	8	6	6	6	2.67	3.17	2.89	3.11	2.83	2.94
	Electrical Engineering	71	41	43	47	53	2.91	3.15	2.90	2.90	3.19	3.01
	Materials Engineering	6	1	3	3	3	2.56	3.00	2.67	3.22	2.44	2.78
	Mechanical Engineering	50	15	25	20	10	2.89	2.93	3.08	2.95	3.13	3.04
	SEAS Total - Transfer Access	243	141	152	128	112	2.81	2.88	2.98	2.84	3.01	2.94

UCLA Engineering

Mechanical and Aerospace Engineering

For students entering HSSEAS as freshmen between F2005-F2011, between 74-80% have either earned their degree or were still enrolled at HSSEAS by the beginning of the 13th quarter (year 5) and between 72-80% have either earned their degree or were still enrolled at HSSEAS by the beginning of the 16th quarter (year 6). Of the students not enrolled at HSSEAS, many of them changed majors to Letters & Science and have either graduated or are still enrolled as UCLA students outside of HSSEAS. Historically, less than 10% of students admitted to HSSEAS as freshmen completely leave UCLA.

Cohort Year	% Retention to year 5	% Retention to year 6
2005	74	74
2006	74	72
2007	78	78
2008	80	80
2009	76	77
2010	80	80
2011	76	