Mechanical and Aerospace Engineering
Freshman/Sophomore Advising Session

Prof. Yun Wang
Professor, Mechanical and Aerospace Engineering
Mechanical Engineering Undergraduate Advisor

Prof. Feng Liu
Professor, Mechanical and Aerospace Engineering
Aerospace Engineering Undergraduate Advisor

Ms. Robin Jeffers
Director, Undergraduate Student Affairs
Henry Samueli School of Engineering

http://engineering.uci.edu/dept/mae/undergraduate

PLEASE go to https://tinyurl.com/MAEadvising for sign in and quiz!!
Welcome to MAE!

This advising session will:
- describe our programs
- identify various research and other opportunities
- discuss career paths available to you
- indicate additional advising resources
- answer your questions about the AE and ME programs
- more!!

*From a survey and study the relationship between the college experience and college graduates' lives

The odds of thriving in all areas of well-being are:

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher if … Engaged at work</td>
<td>4.6x</td>
</tr>
<tr>
<td>Higher if … [College] prepared me well for life outside of college.</td>
<td>2.5x</td>
</tr>
<tr>
<td>Higher if … [College] passionate about the long-term success of its students.</td>
<td>1.9x</td>
</tr>
<tr>
<td>Higher if … I had a mentor who encouraged me to pursue my goals and dreams.</td>
<td>1.7x</td>
</tr>
<tr>
<td>Higher if … I had at least one professor at [College] who made me excited about learning.</td>
<td>1.5x</td>
</tr>
<tr>
<td>Higher if … My professors at [College] cared about me as a person.</td>
<td>1.7x</td>
</tr>
<tr>
<td>Higher if … graduates experience all three</td>
<td>1.9x</td>
</tr>
<tr>
<td>Higher if … I had an internship or job that allowed me to apply what I was learning in the classroom.</td>
<td>1.5x</td>
</tr>
<tr>
<td>Higher if … I worked on a project that took a semester or more to complete.</td>
<td>1.1x</td>
</tr>
<tr>
<td>Higher if … I was extremely active in extracurricular activities and organizations while attending [College].</td>
<td>1.4x</td>
</tr>
</tbody>
</table>

The odds of being engaged at work are:

<table>
<thead>
<tr>
<th>Factor</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher if … [College] prepared me well for life outside of college.</td>
<td>2.6x</td>
</tr>
<tr>
<td>Higher if … [College] passionate about the long-term success of its students.</td>
<td>2.4x</td>
</tr>
<tr>
<td>Higher if … I had a mentor who encouraged me to pursue my goals and dreams.</td>
<td>2.2x</td>
</tr>
<tr>
<td>Higher if … My professors at [College] cared about me as a person.</td>
<td>1.9x</td>
</tr>
<tr>
<td>Higher if … I had at least one professor at [College] who made me excited about learning.</td>
<td>2.0x</td>
</tr>
<tr>
<td>Higher if … graduates experience all three</td>
<td>2.3x</td>
</tr>
<tr>
<td>Higher if … I had an internship or job that allowed me to apply what I was learning in the classroom.</td>
<td>2.0x</td>
</tr>
<tr>
<td>Higher if … I worked on a project that took a semester or more to complete.</td>
<td>1.8x</td>
</tr>
<tr>
<td>Higher if … I was extremely active in extracurricular activities and organizations while attending [College].</td>
<td>1.8x</td>
</tr>
</tbody>
</table>

The UCI General Catalogue

http://catalogue.uci.edu

- The UCI General Catalogue contains the OFFICIAL requirements for the major
- You may follow requirements of any single catalog from your matriculation year forward
- There may be changes in course offerings that require modifications to the catalog requirements
- Information on course articulation from community colleges at: http://www.assist.org

PLEASE go to https://tinyurl.com/MAEadvising for sign in and quiz!!
How are the AE/ME programs set up?

• Essential foundation
  – Mathematics, Physics and Chemistry

• The CORE

• Specialization and Depth
  – Technical electives

• Engineering Design

• General Education

PLEASE go to https://tinyurl.com/MAEadvising for sign in and quiz!!
Majors

• Mechanical Engineering (189 units)**
  4 technical elective courses, restricted lower-division science courses, General Education courses, Senior design project (MAE189, 3 units minimum)

• Aerospace Engineering (185 units)**
  3 technical elective courses, restricted lower-division science courses, General Education courses, Aircraft design (MAE159)

• Double Majors
  – Mechanical and Aerospace
  – Mechanical or Aerospace and Materials Science Science (See their department undergraduate advisor)
  – others are possible, but less common

*Students with demonstrated competence in a foreign language are allowed to take 5 fewer units.
+Students who do not place in Physics 7C must add at least 4 units.

PLEASE go to https://tinyurl.com/MAEadvising for sign in and quiz!!
General Education Requirements

• Gen Ed requirements in Science & Technology, Quantitative Reasoning, and Laboratory will be met through major requirements.

• 10 additional Gen Ed courses (41 units) are required; suitable slots are identified in the sample program of study.

• One Gen Ed slot must be used for a foreign language course, unless you advance-place in a foreign language, in which case you may remove one course (5 units) from the above.

• You are required by the Major requirements to use one of those course slots for Economics 23.

Take Economics 23 as early as possible (Spring So year). One special ENG-specific discussion is offered for MAE students: PLEASE ENROLL IN THE ENG-SPECIFIC DISCUSSION.
General Education Requirements

• The remaining eight courses must be distributed as follows:
  – 3 in Writing;
  – 2 (plus Economics 23 or Econ 20A) in Social & Behavioral Sciences;
  – 3 in Arts & Humanities.

• ENGR 190 W (upper division writing course) is a required course.

• By appropriately choosing the courses to satisfy the requirements above, you can simultaneously satisfy the requirements for one course in Multicultural Studies and one course in International/Global Issues.

• The UCI Catalogue contains a sample plan of studies that meets all requirements.
Freshman Year

• Math and Science
  Physics and math are pre-req.’s for nearly all required courses in MAE, hence falling behind in these subjects is a big problem!!! If you are off track in math or physics:
  • See a counselor
  • Use your summer to make up

• MAE10 – Programming (Any programing courses using Matlab, C, and Python. can be used to replace MAE10)

• ENGR 7A/7B – Introduction to Engineering (Experiential learning)
  – Not required, but will replace a tech. elective in upper division

PLEASE go to https://tinyurl.com/MAEadvising for sign in and quiz!!
### AE / ME Freshman Year (45/49 units)

<table>
<thead>
<tr>
<th>Fall (16 units)</th>
<th>Winter (16 units)</th>
<th>Spring (13 units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 2A</td>
<td>Math 2B</td>
<td>Math 2D</td>
</tr>
<tr>
<td>MAE 10</td>
<td>Phys. 7C, 7LC**</td>
<td>Phys. 7D, 7LD</td>
</tr>
<tr>
<td>Chem. 1A</td>
<td>Chem. 1LE</td>
<td>Basic Sci. Elect. (or Gen. Ed.)</td>
</tr>
<tr>
<td>(ENGR 7A)*</td>
<td>(ENGR 7B)*</td>
<td></td>
</tr>
</tbody>
</table>

*ENGR 7A-7B is a technical elective, available only to first year students in Fall and Winter quarters. Both ENGR 7A & 7B must be taken to count as a technical elective. If ENGR 7A-7B is taken, this will replace one engineering elective course in the senior year.

** Remedial Course needed for Students who cannot place in Physics: Take Physics 2 and then Physics 7C, 7LC

*These are recommendations, not required.*
## AE / ME Sophomore Year (46 / 50 units)

<table>
<thead>
<tr>
<th>Fall (18 units)</th>
<th>Winter (16 units)</th>
<th>Spring (12/16 units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Math 3A</td>
<td>Math 3D</td>
<td>Math 2E</td>
</tr>
<tr>
<td>Phys. 7E, 52A</td>
<td>ENGR 54</td>
<td>MAE 91</td>
</tr>
<tr>
<td>MAE 30</td>
<td>MAE 80</td>
<td>MAE 52</td>
</tr>
<tr>
<td>Gen. Ed.</td>
<td>MAE 60</td>
<td>Econ 20A or 23</td>
</tr>
</tbody>
</table>

(or Gen. Ed.)

*These are recommendations, not required.*
Math and Science are essential!!!

- You will use them in all of your engineering courses
- They are the foundation of engineering models and algorithms
- Engineering models are used for predicting system behavior and achieving design objectives without system overdesign.

Example: Build SAE formula car as light as possible but still capable of withstanding dynamic loads during a race
The Cut

- Minimum Grade requirements to enter MAE130A
  - At least C- in Math 2D, Math 3D, Math 2E, Phys 7C, MAE 30, MAE 80, MAE 91 …

- GPA requirements
  - A GPA of 2.0 or better is considered “good academic standing”
  - However, better jobs and graduate school require a far higher GPA (3.0 or better)
Junior Year

• Heart of engineering fundamentals
• Widely considered the most challenging year (9 required engineering courses)
• MAE 57 – “Machine Shop” is a very valuable 2-unit elective course (particularly for research and projects), but no longer available. It is now one of the ENGR100 courses. It is also very restricted (add-code only) with only a couple offerings per quarter. Alternative is to get machining experience at community colleges (OCC, for example).
• MAE 106 - Build a robotic device and compete!
### AE / ME Junior Year (45/49 units)

<table>
<thead>
<tr>
<th>Fall (13/17 units)</th>
<th>Winter (16 units)</th>
<th>Spring (16 units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAE 150, 150L</td>
<td>MAE 146</td>
<td>MAE 106</td>
</tr>
<tr>
<td>MAE 130A</td>
<td>MAE 130B</td>
<td><strong>MAE 108</strong></td>
</tr>
<tr>
<td><strong>MAE 115 or</strong></td>
<td><strong>MAE 157</strong></td>
<td><strong>MAE 135</strong></td>
</tr>
<tr>
<td><strong>MAE 112 (W)</strong></td>
<td><strong>MAE 156 or 157</strong></td>
<td><strong>MAE 145</strong></td>
</tr>
<tr>
<td>(or Gen. Ed.)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*These are recommendations, not required.*
Senior Year

• Engineering depth and design

• Technical electives (ME 16 units; AE 12 units)
  – Check MAE web pages for rules applying to technical electives and a list of accepted courses
  – ME majors: Check specialization requirements

• Double majors must fulfill all requirements for both majors.
# AE / ME Senior Year (49/45 units)

<table>
<thead>
<tr>
<th>Fall (12/16 units)</th>
<th>Winter (16 units)</th>
<th>Spring (17 units)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAE 112</td>
<td>MAE 175</td>
<td>MAE 159</td>
</tr>
<tr>
<td>MAE 107</td>
<td>MAE 151</td>
<td>MAE 189</td>
</tr>
<tr>
<td>MAE 136</td>
<td>MAE 158</td>
<td>Tech. Elec. 2</td>
</tr>
<tr>
<td></td>
<td>Tech. Elec. 3</td>
<td></td>
</tr>
<tr>
<td>MAE 170</td>
<td>Tech. Elec. 1*</td>
<td>Tech. Elec. 4</td>
</tr>
<tr>
<td></td>
<td>Tech. Elec. 3</td>
<td></td>
</tr>
</tbody>
</table>

*One technical elective can be omitted if the student took ENGR 7A/B in freshman year.*

*These are recommendations, not required.*
Specializations in ME

Specializations consist of 2 technical elective courses taken in the specialty area along with completion of a senior project relevant to the specialization (see details in the catalogue)

- Aerospace Engineering
- Energy Systems and Environmental Engineering
- Flow Physics and Propulsion Systems
- Design of Mechanical Systems
ME 189 Senior Design Projects

Web page:

http://projects.eng.uci.edu/department/mae

- Students with senior standing can enroll in MAE 189
- There are ways for non-senior students to participate (ENGR 7A/7B, MAE93, MAE193)
- Examine list of projects (also check the web page through the summer)
- Form a team, find an advisor, and start on projects right away
- Contact the faculty advisor for a particular project, or Prof. Dunn-Rankin and Prof. Mark Walter, for help
- Display Day is (usually) Friday of finals week
- Fabrication training and resources are available
RapidTech@UCI

RapidTech Equipment

- Z Corp 3D Printing (x3)
- 3D Systems StereoLithography (x3)
- 3D Systems Selective Laser Sintering (x2)
- Stratasys Fused Deposition Modeling (x2)
- 3D Systems Multi-jet (x5)
- Objet Poly-Jet Modeling
- Concept laser MLAB R*
- EOS M290*
- EOS P395*
- Stratasys Fortus MC 400 (x2)*
- EOS Formiga P110*
- OMAX Waterjet
- HAAS CNC (Mill & Lathe)
- EnVisionTEC DLP
- Laser Scanning (x4)
- Thermo Vacuum Forming
- Fiberglass & Composite Tooling
- Metal Plating
- 3D Design Software

Contact us at: UCIFABWORKS@gmail.com
Phone: 949 824 5667

Train for FREE: Laser Cutter, 3d Printer, Desktop CNC, Sewing Machines, 3d Scanners and more…

http://fabworks.eng.uci.edu
Sample Projects

- Formula SAE - Small scale racer
- SAE Aero Design West - Cargo plane
- AIAA Design-Build-Fly Project
- AIAA Human Powered Airplane
- UCI Satellite Project
- UCI Rocket Project
- UCI Hyperxite
More Sample Projects

- Streamlining IC Engine Components
- Wafer Fabrication Probe Station
- Finite Element Analysis of Human Bone
- ASME Human Powered Vehicle
- Profiling Meteorological Mast
- Flight Control
- Fuel Cell Power
- Wind turbine
SAE FORMULA CAR

https://zotfunder.give.uci.edu/project/11222
https://www.youtube.com/watch?v=ePKLwGWOOhXQ&t=106s
Additional/Alternative Design Opportunity

MAE 188 – Engineering Design in Industry

Work in a team of 4-5 students and one industry supervisor to tackle a project proposed by a local company. Identify challenges, review the state of the art in a field, perform design activities, demonstrate concepts, present deliverables and prepare reports.
Research Opportunities

• MAE 199 - Independent Study
Contact a faculty member to inquire about research opportunities in their group. If needed, funding can be provided by two mechanisms:
  – **UROP** (Undergraduate Research Opportunity Program) provides small grants to successful proposals (~$1K range) to cover M&S
  – **SURP** (Summer Undergraduate Research Program) provides a 10-week salary for full-time summer research.

http://www.urop.uci.edu/
Research Areas

• Fluid dynamics
• Robotics and biorobotics
• Controls
• Combustion
• Air pollution
• MEMS (microelectromechanical systems)
• Laser diagnostics
• Flight dynamics
• Aerospace Propulsion
• Aerospace Structures
• Mechanics of Materials
• Fuel Cells
• …
Research

Mars Landing

Perfect Approach Navigation

Pathfinder Landing Dispersion Ellipse

1 km radius

10 km Radius
MAE Seminars

Cutting-edge Research at UCI and world?

WINTER 2018 SEMINAR SERIES

Friday 10:30-11:30 am, McDonnell Douglas Engineering Auditorium

January 11
JAMES W. GREGORY
Professor, Mechanical and Aerospace Engineering, Ohio State University
“Unsteady Compressible Aerodynamics in a Time-Varying Freestream”

January 18
ALI-AKBAR AGHA-MOHAMMADI
Robotics Research Technologist, Jet Propulsion Laboratory
“Stochastic Control Systems and Estimation”

January 25
ALEXANDER BALANDIN
Distinguished Professor, Electrical and Computer Engineering, UC Riverside
“Unique Heat conduction Properties of Graphene - Applications in Thermal Management”

February 1
KAUSHIK BHATTACHARYA
Vice Provost, Professor, Mechanics and Materials Science, Civil and Environmental Engineering, California Institute of Technology
“Mechanical Behavior of Solids”

February 8
J. MICHAEL MCCARTHY
Professor, Mechanical and Aerospace Engineering, University of California, Irvine
“Design of Linkage Systems to Draw Specified Curves”

February 15
NOEL CLEMENS
Department Chair, Professor, Aerospace Engineering and Engineering Mechanics, University of Texas at Austin
“Unsteadiness of Shock Wave / Turbulent Boundary Layer Interactions”

March 1
AMIR FAGHRI
Distinguished Professor of Engineering and Distinguished Dean Emeritus of Engineering, Mechanical Engineering, University of Connecticut
“Multiphase Thermal Management”

March 8
ERIC SUNADA
Thermal Technologist, Jet Propulsion Laboratory
“JPL’S THERMAL CONTROL TECHNOLOGIES FOR FUTURE SPACE SCIENCE EXPLORATION”
Other Opportunities

• Student Chapters and Honor Societies
  – Pi Tau Sigma (ME Honor Society)
  – Sigma Gamma Tau (AE Honor Society)
  – Tau Beta Pi (ENG Honor Society)
  – ASME
  – SAE
  – AIAA

• Student government
  – ASUCI
  – Engineering Student Council
Study Abroad!
The world is your classroom...

UC Education Abroad Program Deadlines for summer and fall:
https://studyabroad.uci.edu/deadlines-apply/

• FACT: You CAN take courses abroad that fulfill your degree requirements!
• FACT: You CAN afford it! Financial aid and scholarships apply!

Visit UCI’s Study Abroad Center in Student Services II, Room 1100 (across from the Zot-n-Go). www.studyabroad.uci.edu

Come see the EAP Mentors in REC 305
UCI Academic Honesty Code

UCI has a very serious Academic Honesty Code. Violations are not tolerated under any circumstances. Please carefully read: https://aisc.uci.edu/index

- Any student cited for Academic Misconduct will have the report kept on file for 5 years.
- During this time, a second incident report would likely trigger suspension or dismissal from UCI.
- A single incident on file usually also results in the student being ineligible for honors at graduation.
- Many graduate and professional programs request this information and it may affect admission.
Career Paths

- **Graduate School (MS/PhD)**
  - Consider accelerated BS/MS program ([link](http://www.career.uci.edu))
  - Engage in individual research ASAP (Sophomore or early Junior year)

- **Industry employment**
  - UCI career center [http://www.career.uci.edu/](http://www.career.uci.edu/)
  - 4 Career fairs on campus each year
  - Design experiences give you an edge!
Education Pays

Unemployment rate in 2012 (%)

- Doctoral degree: 2.5%
- Professional degree: 2.1%
- Master's degree: 3.5%
- Bachelor's degree: 4.5%
- Associate's degree: 6.2%
- Some college, no degree: 7.7%
- High school diploma: 8.3%
- Less than a high school diploma: 12.4%

All workers: 6.8%

Median weekly earnings in 2012 ($)

- Doctoral degree: $1,624
- Professional degree: $1,735
- Master's degree: $1,300
- Bachelor's degree: $1,066
- Associate's degree: $785
- Some college, no degree: $727
- High school diploma: $652
- Less than a high school diploma: $471

All workers: $815

Advising Resources

- UGSA (Undergraduate Student Affairs Office) http://undergraduate.eng.uci.edu/
- UAs (Undergraduate Advisors)
  - AE Program: Prof. Feng Liu
  - ME Program: Prof: Yun Wang
- Catalogue http://catalogue.uci.edu
- UCI MAE website http://engineering.uci.edu/dept/mae/undergraduate
Thank You for Attending Questions?

DEPARTMENT OF MECHANICAL AND AEROSPACE ENGINEERING

Discovery • Creation • Service

Our mission is to educate students to be world class engineers and leaders, in California and beyond, by engaging them in a stimulating community dedicated to the discovery of knowledge, the creation of new technologies, and service to society.

THE HENRY SAMUELI SCHOOL OF ENGINEERING
UNIVERSITY OF CALIFORNIA • IRVINE