

# Mechanical and Aerospace Engineering Freshman/Sophomore Advising Session

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

***PLEASE go to***

**[ywang.eng.uci.edu](http://ywang.eng.uci.edu)**

***for sign in and quiz!!***

#### Outreach Activities:

1. Undergraduate Renewable Energy Desi
2. High-school Visit and Hands-on Experi
3. Summer Research Position for High-sci
4. Undergraduate Research Opportunities
5. ME Undergraduate Advising ([link](#))



**SAMUELI**  
SCHOOL OF ENGINEERING  
UNIVERSITY of CALIFORNIA • IRVINE

Department of  
Mechanical and  
Aerospace Engineering

# 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



# The UCI General Catalogue

<http://catalogue.uci.edu>

- The [UCI General Catalogue](http://catalogue.uci.edu) 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>



# 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

# 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 (See their department undergraduate advisor)
  - others are possible, but less common

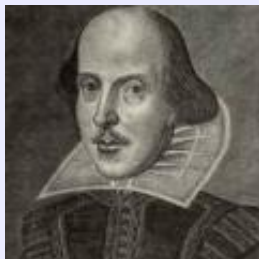
**\*Students with demonstrated competence in a foreign language are allowed to take 5 fewer units.**

**+Students who do not place in Physics 7C must add at least 4 units.**

# General Education Requirements

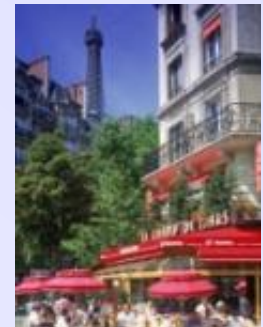
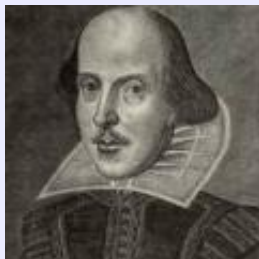
- Gen Ed requirements in Science & Technology, Quantitative Reasoning, and Laboratory will be met through major requirements.
- 10 additional Gen Ed courses (41 units) are required; suitable slots are identified in the sample program of study
- One Gen Ed slot must be used for a **foreign language course**, 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.



# Technical Elective Requirements

## Mechanical Engineering

### Rules for Selecting Technical Elective Courses for the Mechanical Engineering Degree

1. Students must select a minimum of 16 units of technical electives, none of which can be used for other degree requirement.
  
2. At least 8 units must come from the following list of mechanical engineering oriented MAE courses: MAE110, MAE115, MAE112, MAE113, MAE114, MAE117, MAE118, MAE132, MAE140, MAE152, MAE155, MAE164, ENGR165, MAE171, MAE172, MAE183 and MAE185.
  
3. Additional units may come from:
  - a. Any upper-division course in the MAE department, including MAE188, MAE189, MAE195, and MAE199.
  
  - b. The following preapproved list (without requesting the approval of the ME Undergraduate Advisor): ENGR 7A & 7B\*, CEE125, CEE160, CEE162, CEE173, EECS152A, EECS152B, CBEMS110, BME111, BME120, BME121, Stats67, CompSci 131; Math 112A, 112B, 112C, 114A; Physics 111A, 111B, 112A, 112B, Physics 106.
  
  - c. Other departments' upper-division courses with approval of the Undergraduate Advisor.

*\* ENGR 7A-7B can be counted as 4 units of technical electives. ENGR 7A-7B is available only to first year students in Fall and Winter quarters. Both ENGR 7A-7B must be taken to be counted as a technical elective.*



# Technical Elective Requirements

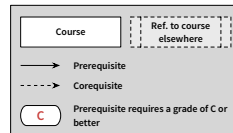
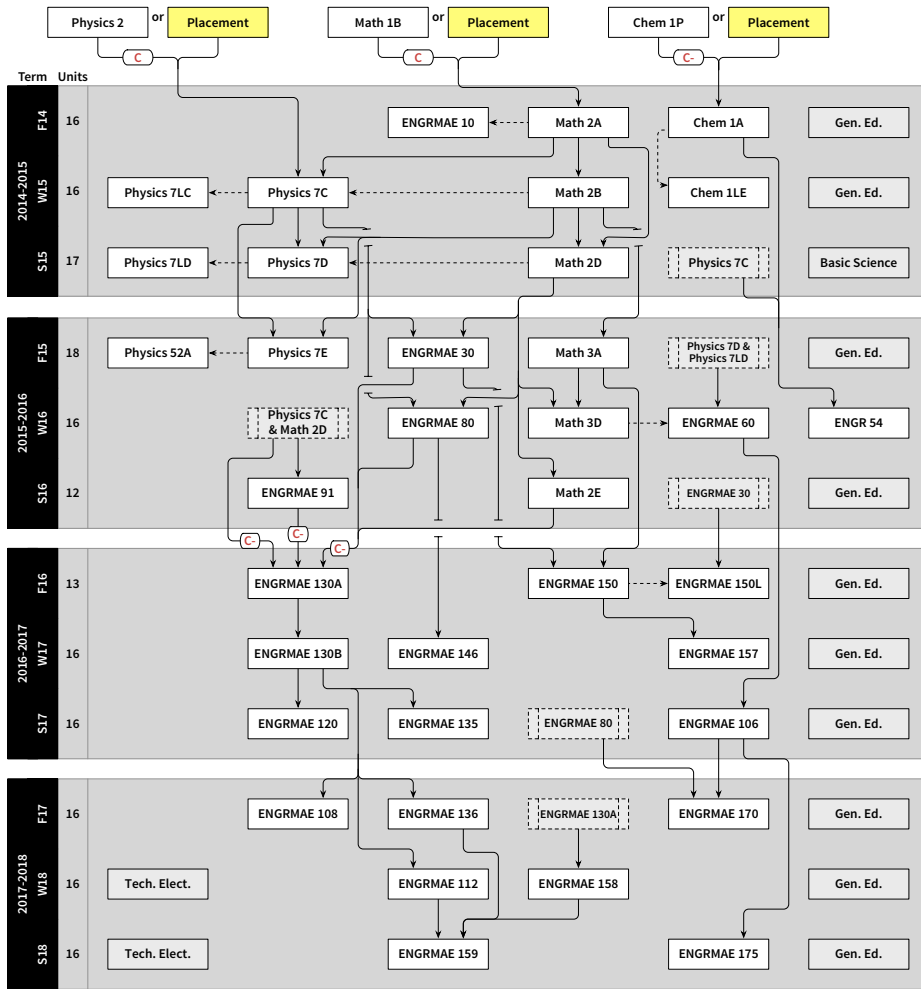
## Aerospace Engineering

### Rules for Selecting Technical Elective Courses for the Aerospace Engineering Degree

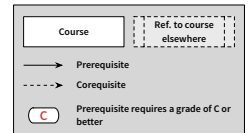
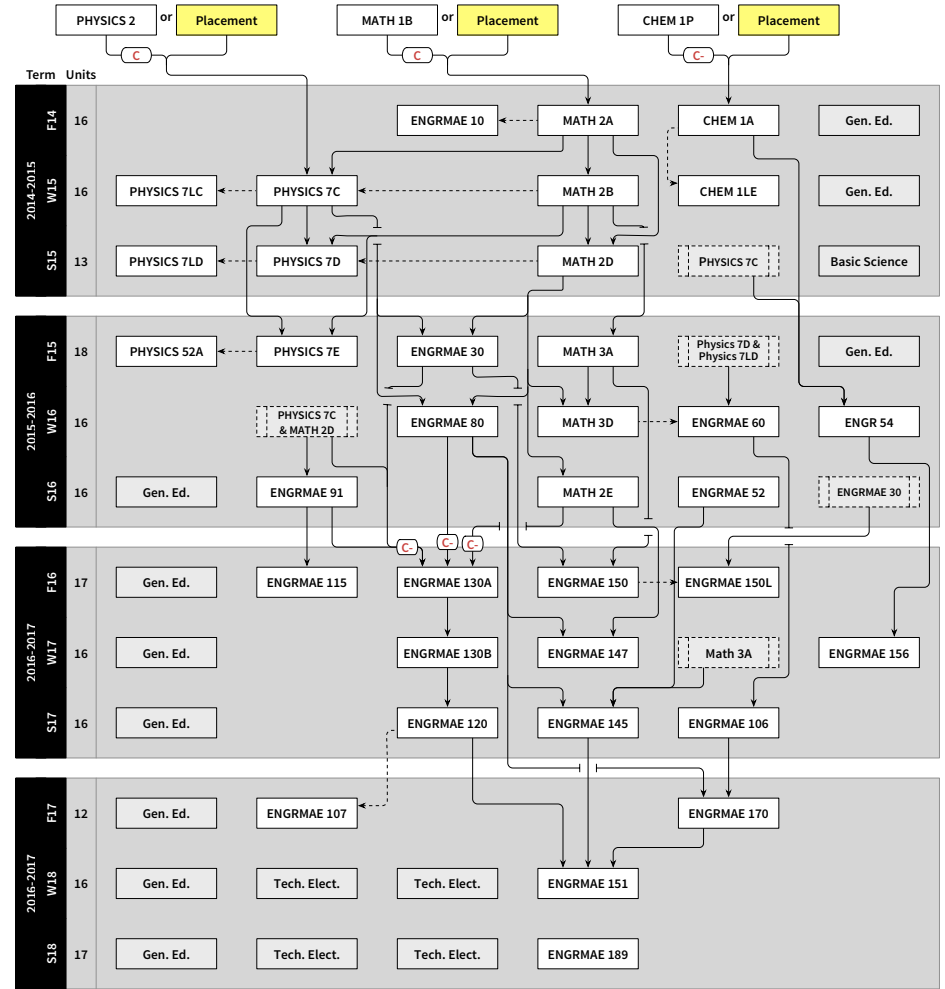
1. Students must select a minimum of 12 units of technical electives, incorporating at least 1 unit of design.
  2. Any upper-division course in the MAE department that is not a core AE course can be used as a technical elective.
  3. With approval of the Undergraduate Advisor, AE students may choose technical elective units from other departments' upper-division courses that have primarily technical content. The following courses are preapproved, and can be taken without requesting the approval of the AE Undergraduate Advisor: ENGR 7A & 7B\*, CEE125, CEE160, ENGR165, EECS152A, EECS152B, BME111, BME120, BME121, Stats67, CompSci 131; Math 112A, 112B, 112C, 114A; Physics 111A, 111B, 112A, 112B.
- *ENGR 7A-7B can be counted as 4 units of technical electives. ENGR 7A-7B is available only to first year students in Fall and Winter quarters. Both ENGR 7A-7B must be taken to be counted as a technical elective.*

# AE and ME Prerequisite Flowchart

**Aerospace Engineering**  
Prerequisite Flowchart (2015-2016)



**Mechanical Engineering**  
Prerequisite Flowchart (2015-2016)



2015-16 version

# Freshman Year

- Math and Science

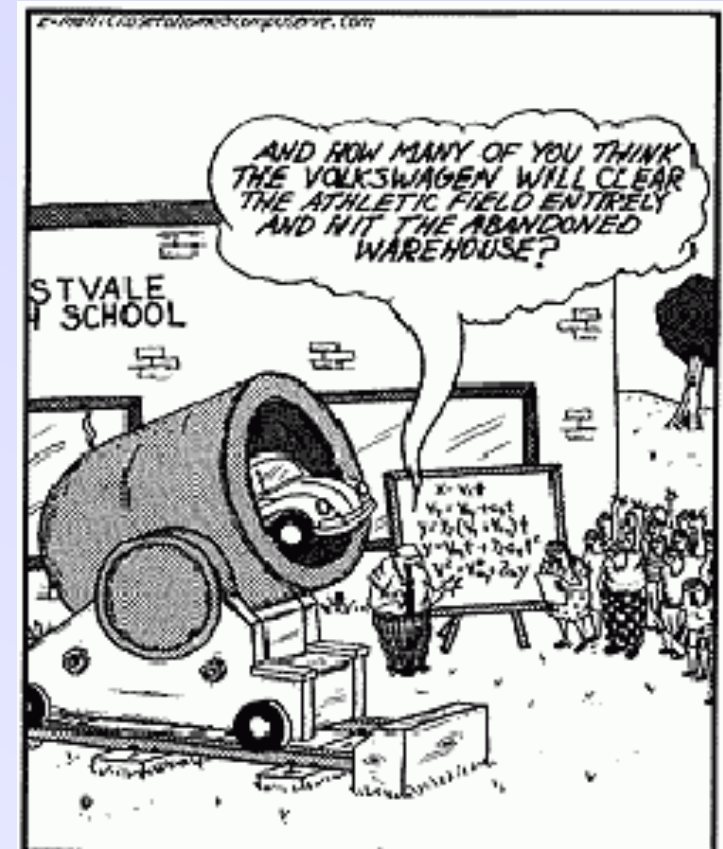
Physics and math are pre-req.'s for nearly all required courses in MAE, hence falling behind in these subjects is a big problem!!! If you are off track in math or physics:

- See a counselor
- Use your summer to make up

- MAE10 – Programming (Any programming courses involving Matlab 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*



Thanks to the innovative labs of teacher Herb Krenley, physics quickly became Westvale High's most popular course.

# AE / ME Freshman Year (45/49 units)

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

\* **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**

# AE / ME Sophomore Year (46 / 50 units)

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

# 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)
- MAE 106 - Build a robotic device and compete!





# AE / ME Junior Year (45/49 units)

<b>Fall</b> <i>(13/17 units)</i>	<b>Winter</b> <i>(16 units)</i>	<b>Spring</b> <i>(16 units)</i>
MAE 150, 150L	MAE 146 MAE 147	MAE 106
MAE 130A	MAE 130B	MAE108 MAE120
MAE 115 or MAE 112 (W)	MAE 157 MAE 156 or 157 or 155	MAE 135 MAE 145
ENGR 190W (or Gen. Ed.)	Gen. Ed.	Gen. Ed.

# 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  
<http://engineering.uci.edu/files/mae-technical-electives.pdf>
  - **ME majors: Check specialization requirements**
- **Double majors** must fulfill all requirements for both majors.

# AE / ME Senior Year (49/45 units)

<b>Fall</b> (12/16 units)	<b>Winter</b> (16 units)	<b>Spring</b> (17 units)
MAE112 MAE 107	MAE175 MAE 151	MAE 159 MAE 189
MAE 136	MAE 158 Tech. Elec. 3	Tech. Elec. 2
MAE 170	Tech. Elec. 1*	Tech. Elec. 4 Tech, Elec. 3
Gen. Ed.	Gen. Ed.	Gen. Ed. (5u)

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

# 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

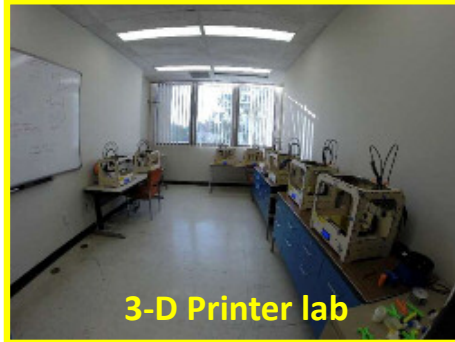
# ME 189 Senior Design Projects

Web page:

<http://gram.eng.uci.edu/~ghubbard/mae189/index.html>

- 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

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#### 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



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# 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*



# 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



# UCI ROCKET



# CHAINLESS CHALLENGE



## 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:

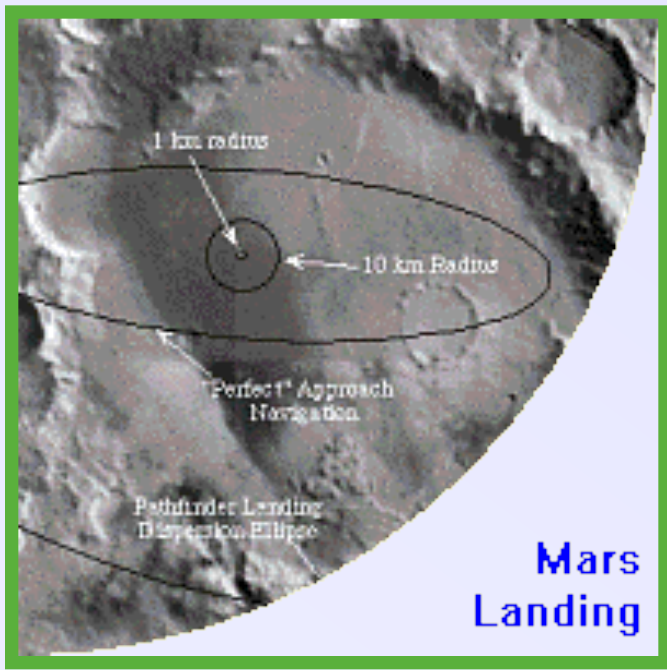
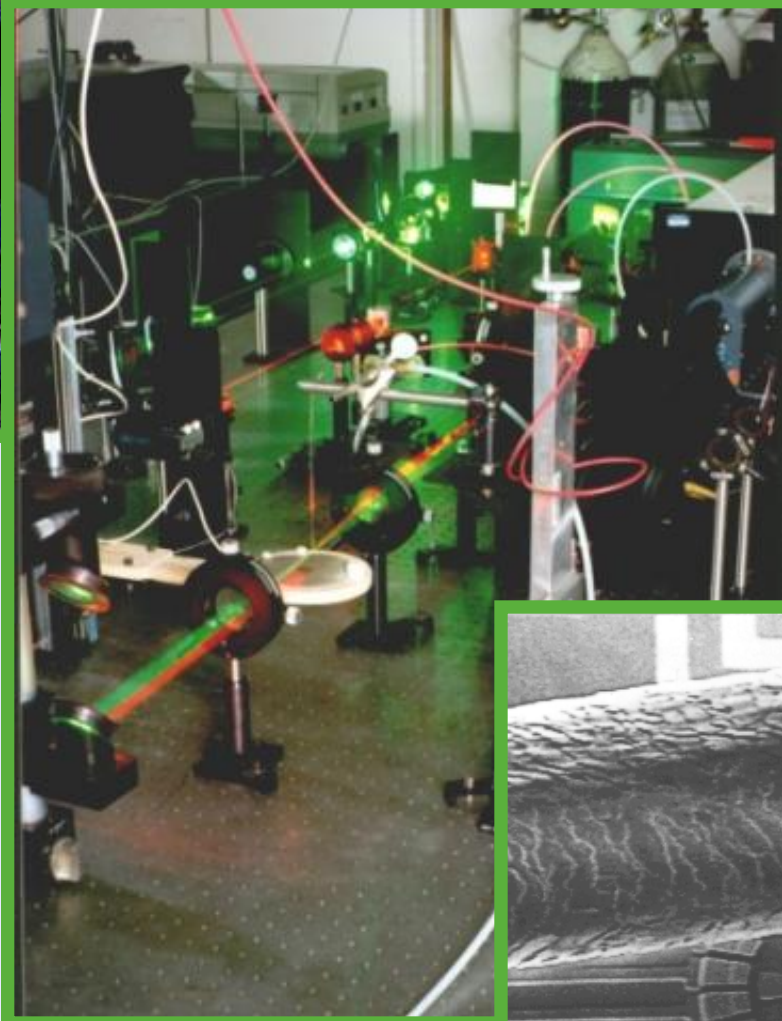
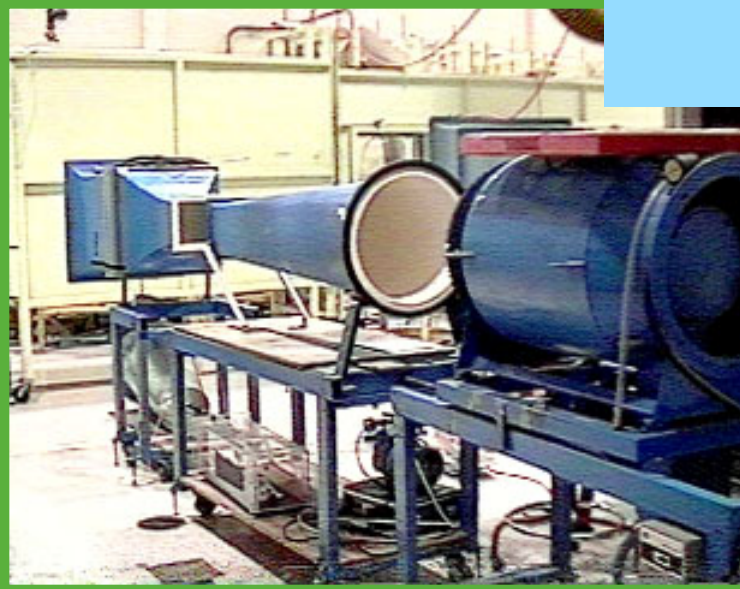
- **UROP** (Undergraduate Research Opportunity Program) provides small grants to successful proposals (~\$1K range) to cover M&S
- **SURP** (Summer Undergraduate Research Program) provides a 10-week salary for full-time summer research.

<http://www.urop.uci.edu/>

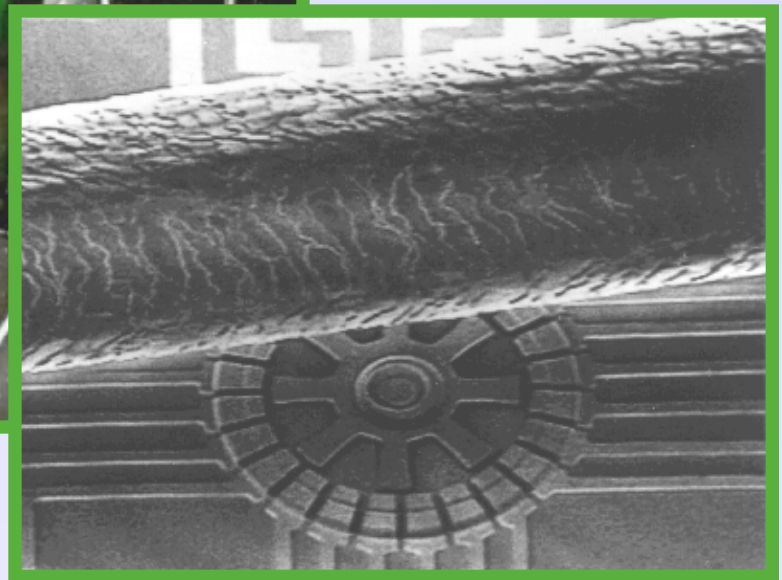
# Research Areas

- **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**





# 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:**

**<http://www.studyabroad.uci.edu/prospective/deadlines.shtml>**

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

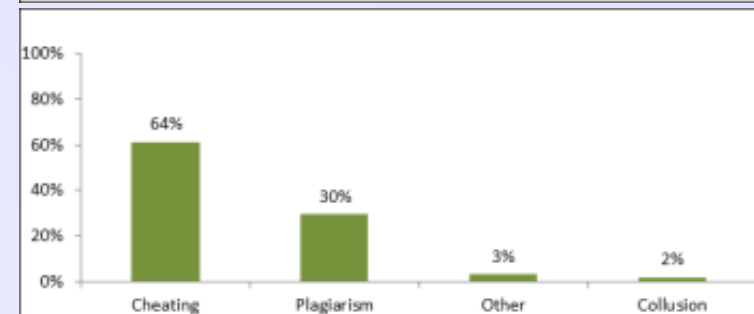
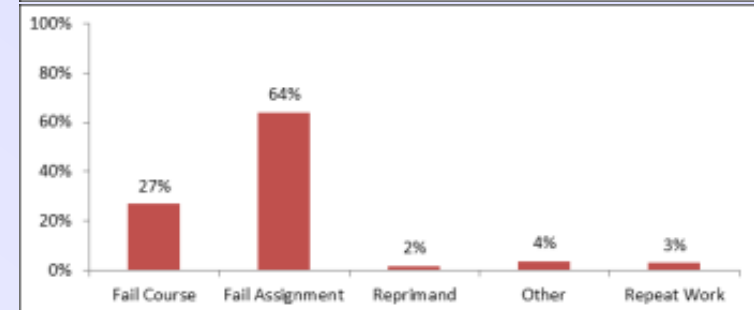
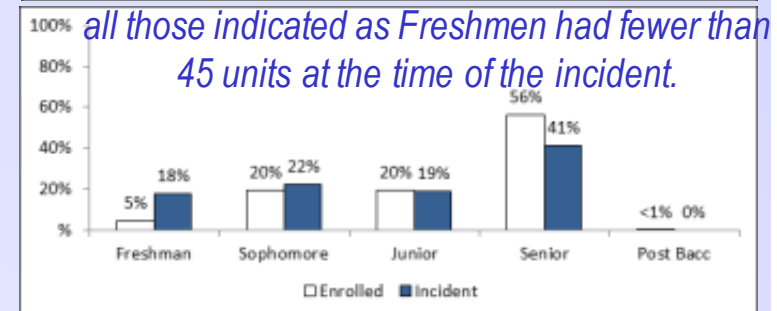
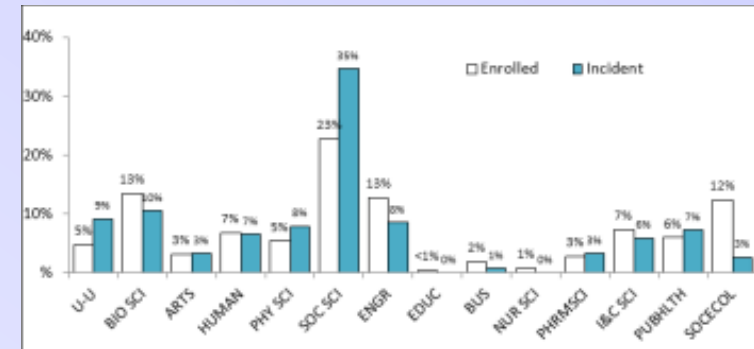
Visit UCI's Study Abroad Center in Student Services II, Room 1100  
(across from the Zot-n-Go). **[www.studyabroad.uci.edu](http://www.studyabroad.uci.edu)**

**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



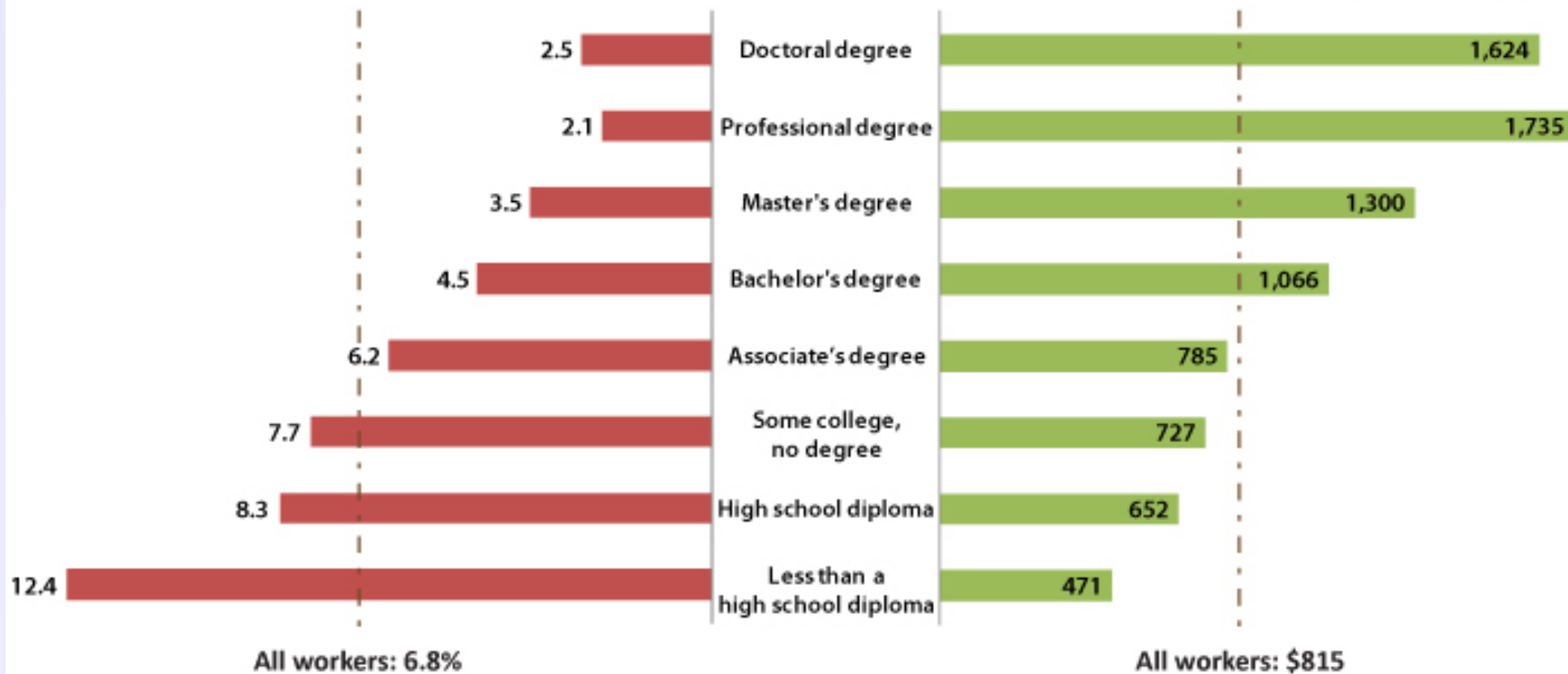
# Career Paths

- ***Graduate School (MS/PhD)***
  - Consider accelerated BS/MS program ([link](#))
  - Engage in individual research ASAP  
(Sophomore or early Junior year)
- ***Industry employment***
  - UCI career center <http://www.career.uci.edu/>
  - 4 Career fairs on campus each year
  - Design experiences give you an edge!

## Education Pays

Unemployment rate in 2012 (%)

Median weekly earnings in 2012 (\$)



Source: Bureau of Labor Statistics, Current Population Survey

# 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>

# Some Recent Changes

- **MAE135 is now added as a prerequisite of MAE112**
- **Add MAE114 (fuel cells) in the list of courses for Specialization in Energy System and Environmental Engineering**
- **Students who have earned a C- in a course should not be allowed to retake**

Thank You for Attending

Questions?