

## **E/ME 105a,b Product Design**

**Instructors**      **Ken Pickar (Caltech)**  
**Phil Requejo (Rancho Los Amigos)**  
**Andy Lin (Rancho Los Amigos)**  
**Nathan Allen (Art Center)**  
**Joel Burdick Caltech**

**TA**                    **Tatiana Roy Caltech**

**First Term 2016 (3,0,6)**

**Tuesday Thursday 2:30-4:00 PM**

**Offices:**            **Caltech Gates Thomas 208**  
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**Office hours:**    **please e-mail or call ahead to schedule**

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## **Guest Speakers**

**Ken**

**Henry Evans**

**Joel Burdick**

**Rudy Roy**

**Laura Mosquedo**

## **2016 Schedule tentative!**

### **Fall Class**

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<b>Date Given</b>	<b>Slides</b>	<b>Speaker</b>	<b>Description</b>	<b>HW</b>
Jan 5	Lect 1	Ken Andy/Phil	Introduction to Class- What it is about and expectations Outline of Class Lectures	None
Jan 7	Lect 2	Phil/Andy	Visit to Rancho with dinner. Create Project list for sign-up	

			<p>Include previous projects. posted on website Each Student considers 1,2,3,4 choices</p>	
Jan 12	Lect 3	Ken	Henry Evans Guest Lecturer "How to choose a Project that makes a difference" Discussion of individual choices	Choices Provided to instructors by 5:00 PM, Wed Jan 13. Instructors then assign Teams
Jan 14	Lect 4	Ken	Lecture Team How to write Team Objectives, Rules and Problem statements	Teams provide Objectives, Rules and Problem Statements for Jan 19
Jan 19	Lect 5	Ken	Brainstorming Ideas	
Jan 21	Lect 6	Nate Allen	Prototyping How to "see" what you are trying to produce. start with very crude p-types and then over the class iterate to working models	Teams build first prototypes and submit for Jan 26 demonstration Group self-analysis
Jan 26	Lect 7	Phil/Andy	What we have learned at Rancho- what works or what doesn't work. Visit of Rancho mentor/teammates by car or skype.	HW Readings for Jan 28 Product Development Process Lecture

			Student Demos of prototypes	
Jan 28	Lect 8	Ken	Product Development Process	
Feb 2	Lect 9	Phil/Andy	Lecture	
Feb 4	Lect 10	Rudy Roy	Guest Lecture	
Feb 9	Midterm		Second Prototype presented Progress so far and roadmap for quarter. Group self- analysis. Extended session for individual group meetings with Instructors	
Feb 11 Feb 16	Lect 12	Ken	Sustainability for Product Design	
Feb 18	Lect 13	Phil/Andy	Lecture	HW Readings for 2/23 on Product development Process
Feb 23	Lect 14	Ken	Visitor to talk about manufacturing from company TBD	

Feb 25	Lect 15	Phil/Andy	Lecture	
Mar 1	Lect 16	Ken	Lecture on Ethics of Medical devices	HW How will you run an ethical enterprise?
Mar 3	Lect 17	Phil/Andy	Guest lecturer	
Mar 7, 8	Lect 18	Ken/Phil/Andy	Final Presentations, paper, Testable Prototype and Poster	

**SPRING QUARTER**

Mar 29	Lect 1	Ken		
Mar 31	Lect 2	Phil/Andy		
Apr 5	Lect 3	Ken	Case with Guest speaker	
Apr 7	Lect 4	Phil/Andy	Prototype Review Team Review	

Apr12	Lect 5	Ken	
Apr 14	Lect 6	Phil/Andy	
Apr 19	Lect 7		
Apr 21	Lect 8	Ken	
Apr 26	Lect 9	Phil/Andy	Prototype review
Apr 28	Lect 10	Ken	Team Review
May 3	Lect 11		
May 5	Lect12	Phil/Andy	
May 10	Lect 13	Ken	
May 12	Lect 14	Phil/Andy	
May 17	Lect 15	Ken	Midterm
May 19	Lect 16		
May 24	Lect 17	Phil/Andy	
May 26	Lect 18	Ken	
May 31	Lect 19	Phil/Andy	Prototype review
June 2	Lect 20	Ken	Team Review
June 7	Final Exam		



## **Class Text and books on reserve**

**Guest Lectures**

**Movies**

**Mentors**

**Books and Newspaper articles**

**Politics and Law**

**Personal empathy**

**TED talks to get experts**

**Academic Experts**

**Class Alumni**

**Rudy Roy**

**Tom Oliver**

**Tots**

**Others**

**Cases**

**Q1 Overview of Product development Process and construction of an appropriate prototype**

**Introduction to class**

**Project Choice**

**Teams and Mission Statement**

**Opportunities to continue project: SURF and RESNA presentation**

## **Design subjects to cover by Lecture and by Reading Assignments**

**The product development**

**Product Development Process, Marketing and Positioning**

**Market Research and Analysis**

**Creativity**

**Brainstorming**

**Business/economic Sustainability**

**Design for Cost**

**Human Factors**

**Prototyping**

**Systems Engineering**

**Product architecture**

**Detailed design**

**Prototype system integration**

**Build test and deploy prototype**

**Risk Analysis**

**Ethical Design and other ethical issues**

### **Q 2 Testing of Prototype, Redesign and Business deployment**

**Scheduling**

**Market research on prototype**

**Results of Market research and redesign**

**Class discussion with stakeholders**

**Decision Points should we proceed**

**Design for Manufacturability**

**manufacturing resource**

**Design for Reliability Highly Accelerated Stress Testing**

**Design for Testability**



**Design for Maintainability**  
**Financing – microloans and more**  
**Design for the Environment**  
**Case histories what worked and what didn't**  
**Redesign of product for deployment**  
**Fact Based results: guest lecture**  
**Stakeholders exercise**

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