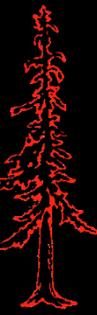
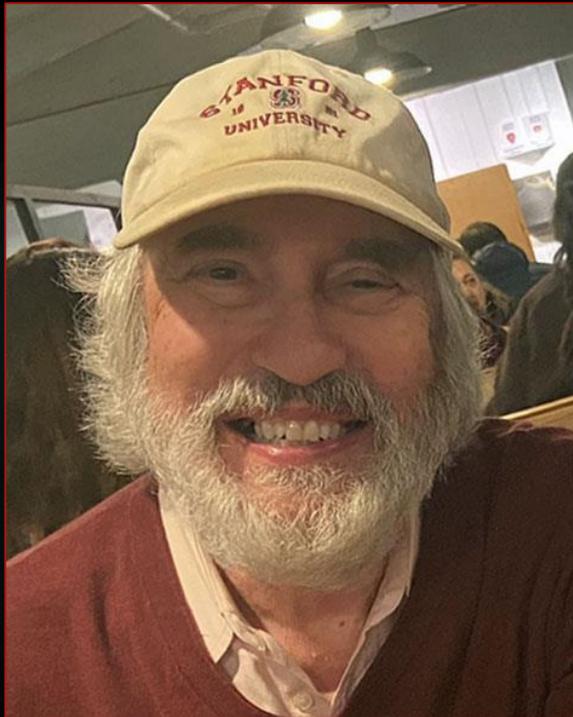


January 7, 2025  
Course Overview & Introduction to Assistive Technology



# ENGR110/210

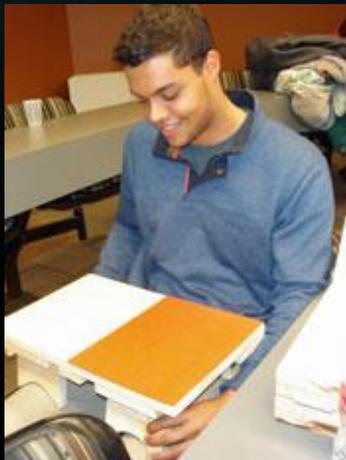
## Perspectives in Assistive Technology



David L. Jaffe, MS  
Instructor

19  
Years

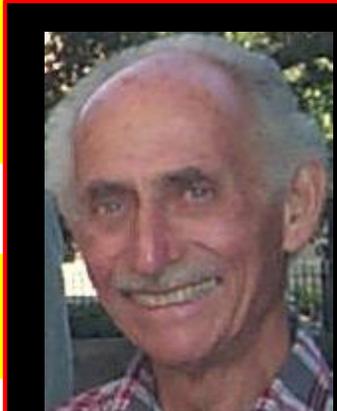
# So Much Fun!



مجلس إدارة جمعية إيدج



Any questions so far?



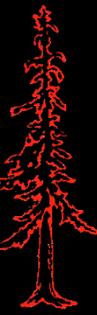
Homage to Prof Kane

# “Have I made a good choice by enrolling in *Perspectives in Assistive Technology*?”

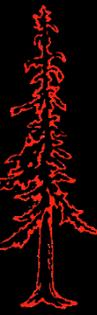
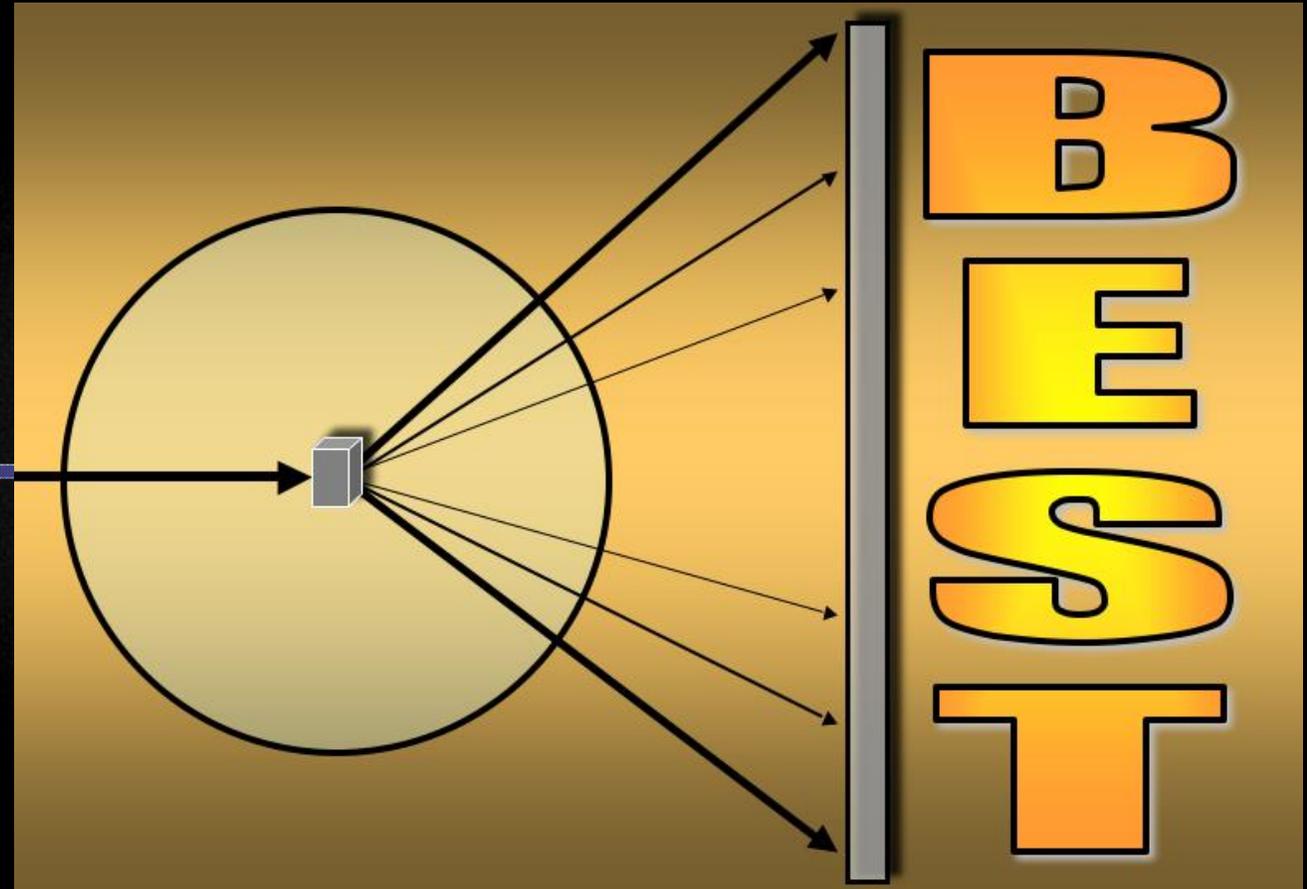


- First day of class
- New course
- New instructor
- Unfamiliar subject

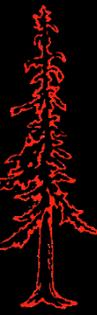
“Have I made a good choice by enrolling in *Perspectives in Assistive Technology*?”



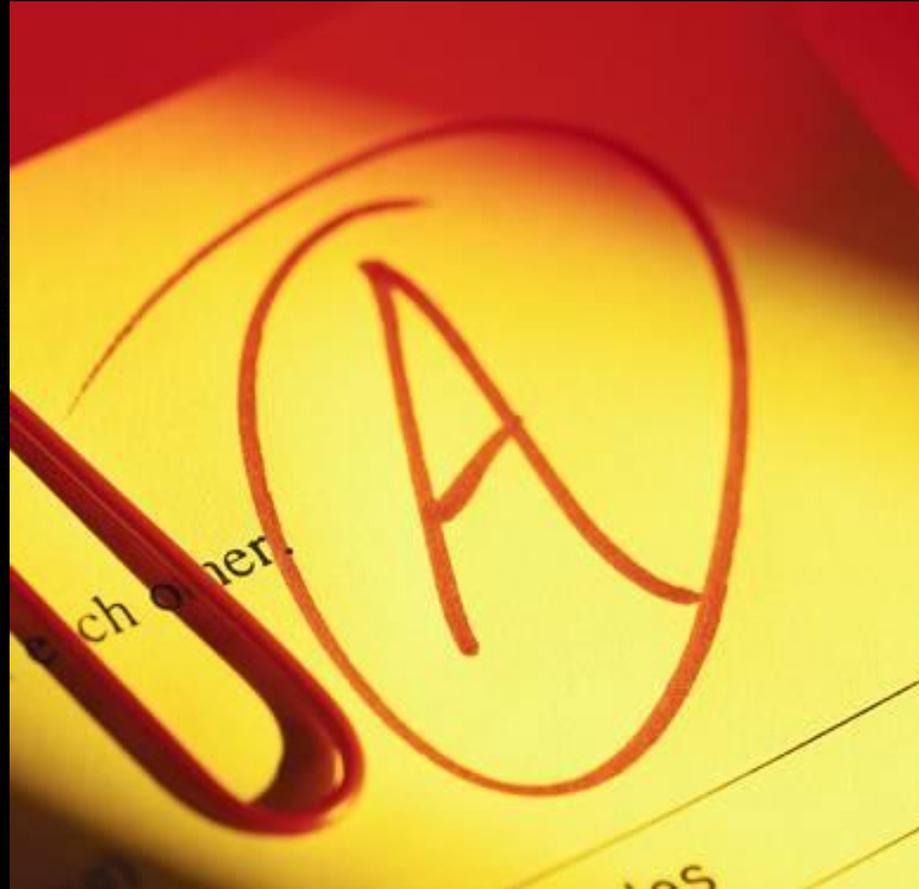
This is the best course I teach



This is the best assistive technology course at Stanford

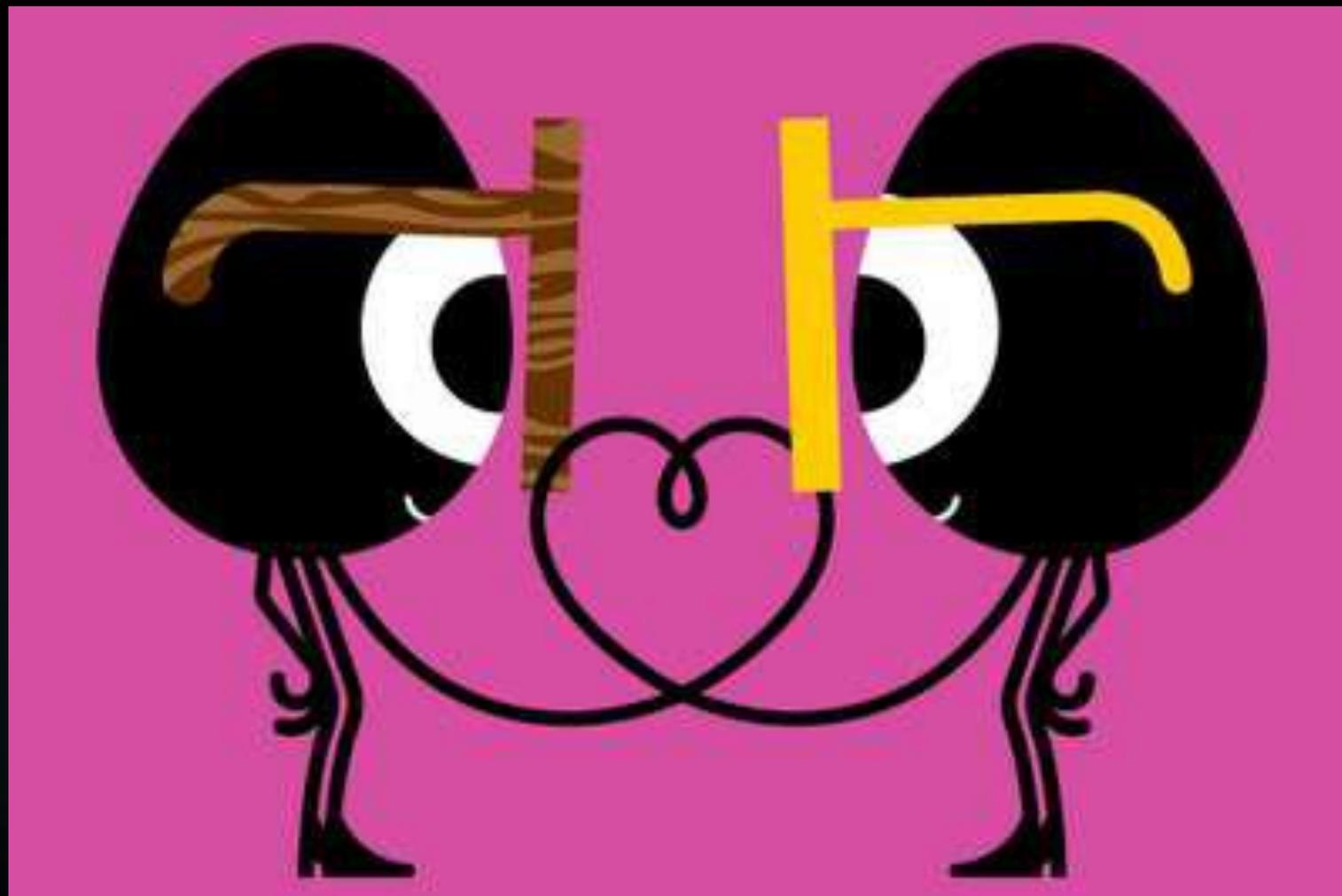


Everyone who has taken this course  
has earned a very good grade



Not everyone gets an "A"

Meet your love connection



# The fame and notoriety



**STANFORD UNIVERSITY**

Web People  
Maps A-Z Index Search

About Stanford Admission Academics Research Life On Campus

Show Expanded Menus

**EVENTS**

MAR 13 S.F. Shakespeare Festival's Hamlet 4 p.m.

MAR 17 'The Eye of the Beholder' exhibit thru May 30  
CROE Seminar: Genomic Data Sharing 4 p.m.

MAR 18 WISDOM From Philosophy to Neuroscience 7 p.m.

**UNIVERSITY NEWS**

**Eclectic blend**  
From hip hop to classical, Stanford dance performance mixes styles from around the world.

**Analyzing land use**  
Silicon Valley conservation didn't hurt housing development, Stanford research finds.

**Hands-on education**  
Students reach local community with designs to help people with disabilities.

**ON STANFORD.EDU**

Stanford Medicine Global Gateway Center for Professional Development

**SPORTS**

MAR 19 Cardinal Softball vs. Santa Clara 6 p.m.

**STANFORD ALUMNI**

Welcome! Login | My Profile Check e-mail Find an alum

**Alumni Center**  
**Alumni Network**  
**Blog**  
**Career Services**  
**Clubs**  
**Discussion groups**  
**Diversity**  
**Events**  
**For students**  
**Lifelong learning**  
**The Loop**  
**Membership**  
**My Class**  
**Reunions**  
**Sierra Camp & Chalet**  
**Stanford links**  
**Stanford magazine**  
**Travel/Study**  
**Volunteering**

**TOP DESTINATIONS**

**SCHOOLS**

- Business
- Earth Sciences
- Education
- Engineering
- Humanities & Sciences
- Law
- Medicine

**ACADEMIC DEPARTMENTS**

- Departments A - Z
- Interdisciplinary Programs

**HOSPITALS**

- Stanford Hospital & Clinics
- Lucile Packard Children's

**LIBRARIES**

- Stanford University Libraries

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Photo: L.A. Cicero/Stanford News Service

### Able Engineering

MARCH 11: Call it "design within reach"—undergraduate and graduate students come together in the Perspectives in Assistive Technology course to design devices that will help people with disabilities in the local community. Junior Harpeet Sangha (above) set out to improve the canes that an elderly man used to keep his balance. Other students created a more practical recharging vest for people who use implanted deep-brain stimulation devices. "These devices we're working on help people go about their lives so their disabilities don't keep them from doing what they want to do," said senior Reid Miller. Read more from the Stanford News Service »

### New Digs on Campus for Economic Policy Research

MARCH 12: A new 32,000-square-foot building opened its doors last week at the corner of Galvez Street and Memorial Way. Named for John A. and Cynthia Fry Gunn, the building will be home to the Stanford Institute for Economic Policy Research. The front of the Gunn building is designed to invoke Stanford's original Memorial Arch, destroyed in the 1906 earthquake. The two wings of the building flank a garden, and there are two red-tile-roof pavilions. John Shoven, director of SIEPR, said, "With the completion of the John A. and Cynthia Fry Gunn Building, SIEPR reaches a new scale and level of influence for improving economic policy." Read more from the Stanford News Service »

Athletics In the Magazine Multimedia Now

#### Women Breeze to Pac-10 Championship

MARCH 14: The women's basketball team romped through the Pac-10 tournament, defeating UCLA 70-46 in the championship game. Senior Jayne Appel started after a sprained ankle had her sidelined for two games. Sophomore Nnemkadi Ogwumike was named MVP of the tournament, totaling 59 points in three games. The Cardinal advances to the NCAA tournament. Read more from gostanford.com »

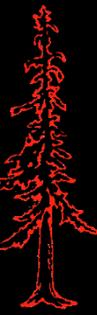
**SCOREBOARD**  
**N. Basketball**  
Stanford 64  
Washington 79

**Synchro.**  
2nd at  
Collegiate  
Nationals

Site Spotlight



# You are compelled to do it



*“Top motivational factors for engineering students are behavioral, psychological, **social good**, and financial.”*

Center for the Advancement of Engineering Education



Service Learning

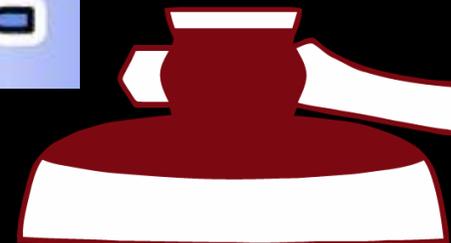


Local Community

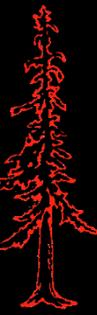


*“Our purpose in life is to help others along the way.”*  
Sandra Day O'Connor

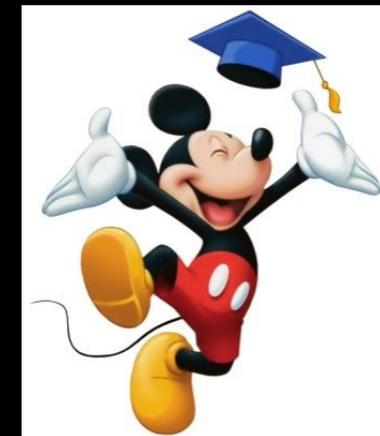
# You want to know if your Stanford education and skills can benefit others



# Factors recent graduates rate most important in choosing their first job



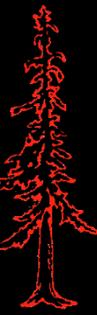
1. Opportunity for advancement
2. Opportunity to benefit society
3. Salary
4. Hours required
5. Travel time to / from work
6. Health benefits
7. Vacation time
8. Bonuses
9. 401(k) matching
10. Relocation opportunity
11. Tuition reimbursement
12. Pension plan
13. Stock options



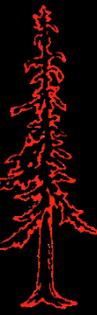
# The job opportunities



# You have heard good things about the course



You want to take something completely different



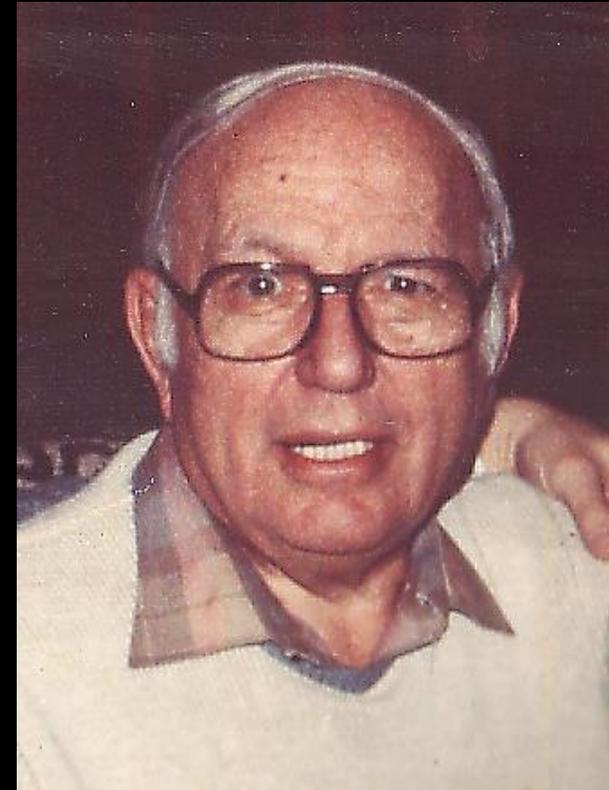
# Call Me "Dave"



"Professor" from Gilligan's Island



Dr. David Zorba (Sam Jaffe)  
from Ben Casey



Mr. Jaffe, my father



David A. Jaffe



David M. Jaffe



Warden David Jaffe

My title is not Professor and I don't have a PhD or MD

**David L. Jaffe, MS**  
**Course Instructor**



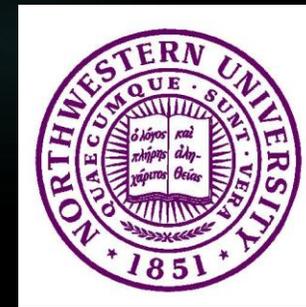
"Partly Sunny"



# More about Me



Go Blue!



Go Cats!



Go Cardinal!

- Education:

- University of Michigan - BS in EE
- Northwestern University - MS in BME



At 22

- Employment:

- Hines VA Hospital
- VA Palo Alto Health Care System - RR&D



Hines VA Hospital



VA Palo Alto RR&D

- Stanford:

- ME170, ME218, ME294, ME310, BioE141, assistive technology projects



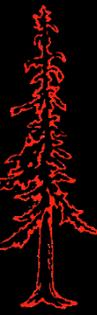
VA Palo Alto

# My Passions

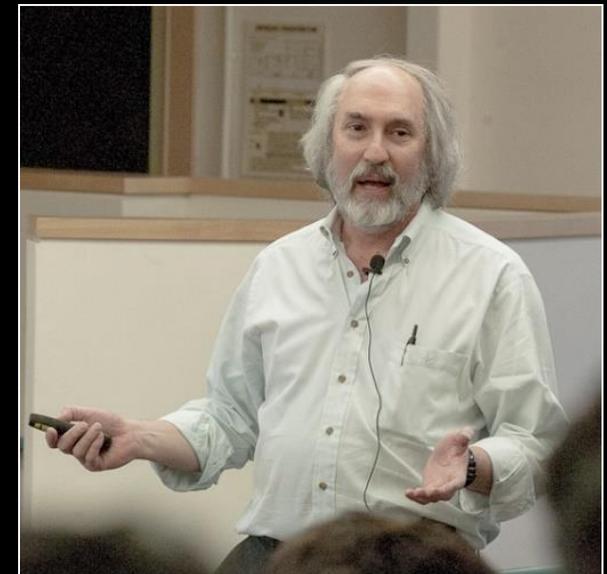
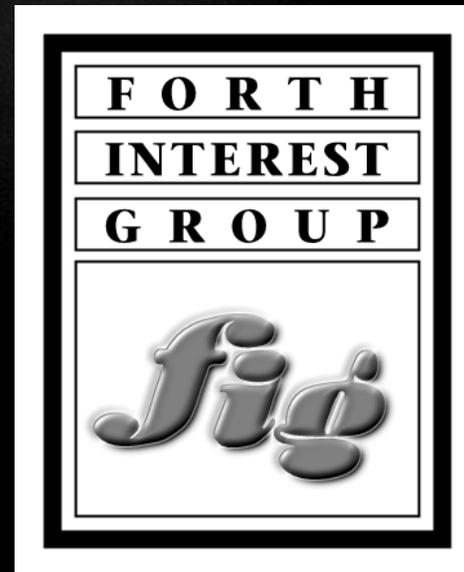
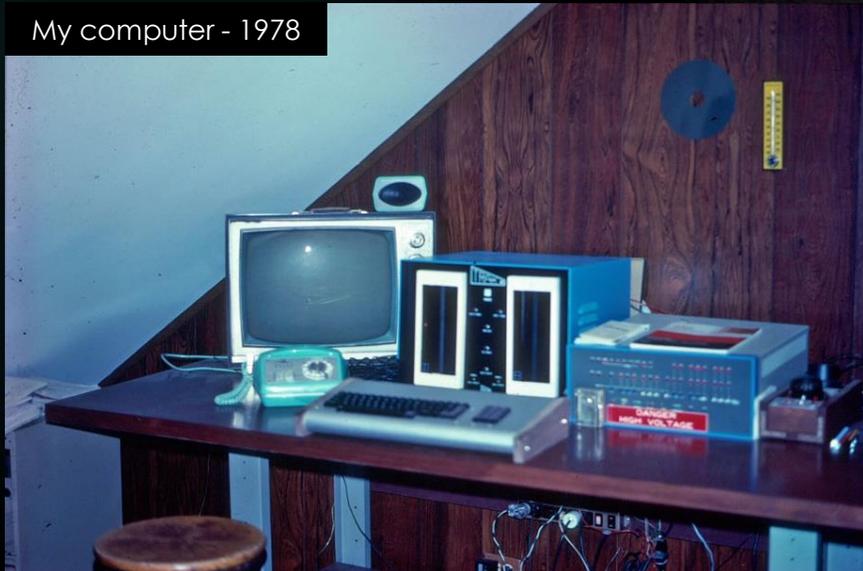
- ▶ Inspired by “Watch Mr Wizard”
- ▶ Early home computer adopter - 1975
- ▶ Forth programming language devotee, embedded systems
- ▶ Teaching human aspects of technology and engineering



Don Herbert



My computer - 1978



# Five numbers that define me

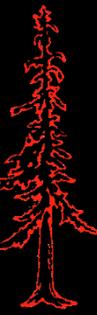
11/11/1979 - arrived in California

18 - years teaching the course

4.6 / 5.0 - 2019 course evaluation score

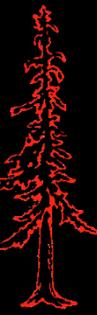
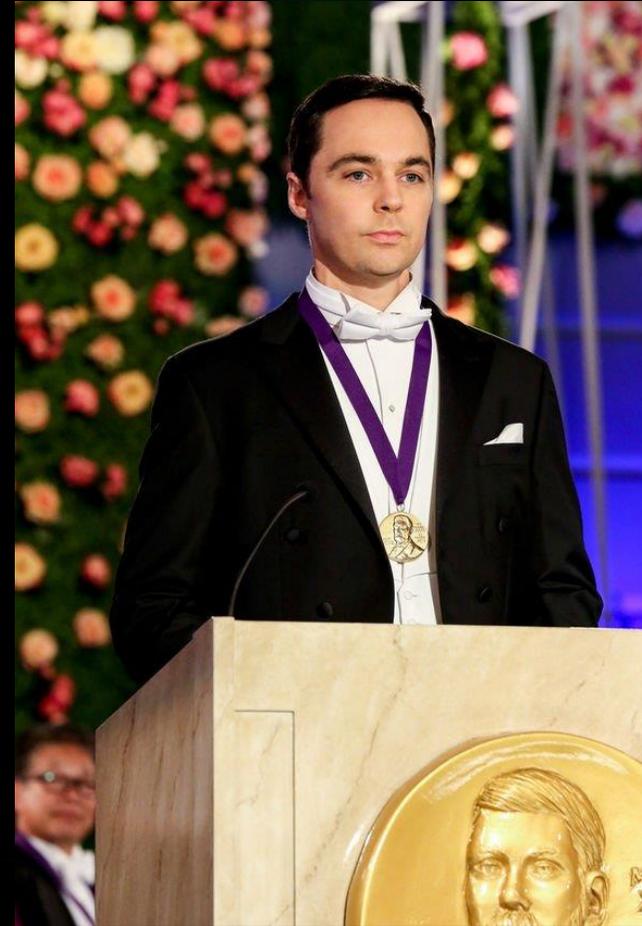
32 - number of students enrolled last year

957 - number of cookies served in course in 2020



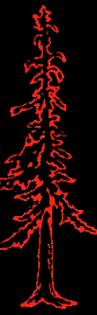
# My Biases and Thinking

- ▶ Engineering
- ▶ Fabricating & testing functional prototypes for / with real users
- ▶ Using quantifiable terms
- ▶ Avoiding subjective analysis

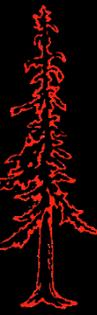


“There is no objective way to classify degrees of goodness.”  
Dr. Sheldon Cooper, Cal Tech Theoretical Physicist and Nobel Laureate

# Course Organizer & Instructor

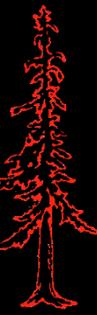


# Course Assistant - Mathilda Kitzmann



“I am a mechanical engineering coterminial student concentrating in manufacturing and mechatronics. I was on the rowing team during my undergrad and have been a researcher in the ARMLAB (Assistive Robotics and Manipulation Lab) for the last two years. I am interested in making, design, robotic dexterity, and soft sensors to improve the field of assistive robotics. Outside of class I enjoy roadbiking, running, cooking, and making bread.”

# Course Assistant - Lance Keneley



“I am a mechanical engineering coterminal student concentrating in biomechanical engineering. I played on the football team at Stanford for 4 years as well as one additional year at the University of Arizona. For my senior capstone, I worked on a team in partnership with Kyaro Assistive Technologies that designed a postural support seat for children with cerebral palsy and hydrocephalus in Tanzania. I am interested in continuing research in assistive technologies particularly for people with fine motor skill impairment. Outside of class, I would describe myself as an adventurer. I value new and fun experiences that challenge my perceptions about people and the world. I also freedive, ski, and cook.”

# Today's Agenda



- ▶ Welcome to the Course
- ▶ Course description
- ▶ Introduction to Assistive Technology
  - ▶ What is Assistive Technology?
    - Definition
    - Population numbers
  - ▶ Assistive Technology research and devices:
    - DJ projects at VA
    - Existing devices and products
    - New technology
- ▶ Student Project Preview
  - ▶ Project Suggestions for this Quarter
  - ▶ Last Year's Student Projects
- ▶ Class Sessions Preview
  - ▶ Lecture Schedule for this Quarter





# Who are these students and why are they smiling?



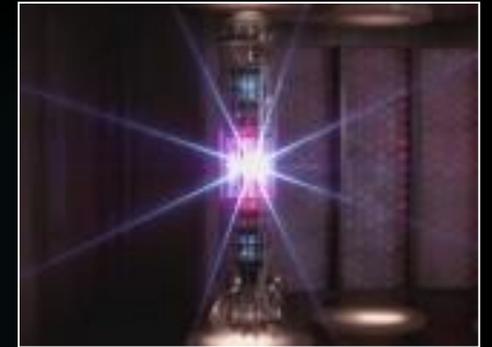
# Class Genesis

- ▶ How this course came about
- ▶ Why is it being offered

Star Trek Genesis Project



The Genesis Planet



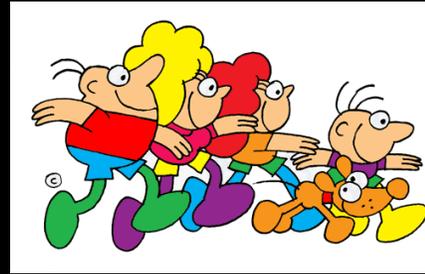
The Genesis Device



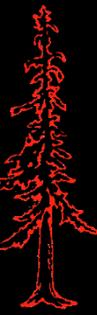
The Rock Group Genesis



# Course Objectives



- ▶ Gain additional **engineering confidence** in applying your knowledge and skills to address real problems in the world.
- ▶ Focus on **critical thinking** and **communication skills**, **working as a team**, and **interacting with individuals in the local community**
- ▶ Learn about the design, development, and use of technology that benefits people with disabilities and older adults
- ▶ **Practice leadership & organization**

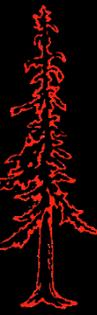


# Skills Exercised

- ▶ Independent & critical thinking
- ▶ Analysis
- ▶ Problem-solving
- ▶ Working in a team
- ▶ Working in the community
- ▶ Public service
- ▶ Service-learning
- ▶ Designing, fabricating, testing, analyzing, iterating
- ▶ Communicating: reports, presentations, class participation
- ▶ **Leadership & Organization**



# What kind of course are you expecting?



- ▶ **Love to study**; do homework and problem sets; take quizzes, exams, and finals?
- ▶ Relish buying and going through an expensive course textbook **chapter by chapter**?
- ▶ Anticipate hearing the **professor's voice** for the entire quarter?
- ▶ Excited about learning something without an obvious **practical application** or that you will just forget next quarter?
- ▶ Want to further improve your ability to **study and take exams**?
- ▶ Enjoy taking notes and smelling a **highlighter**?

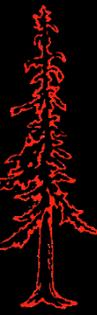


**Expectations are  
premeditated  
resentments.**

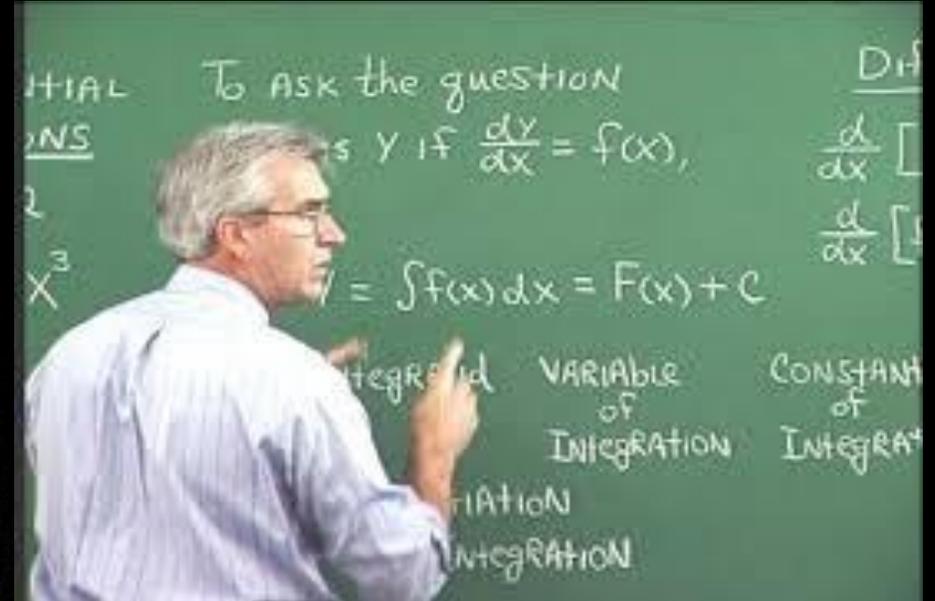
*- Alcoholics Anonymous*

**DANGER**  
**EXPECTATIONS**

# Are These Your Expectations?



- ▶ Equations, derivations, proofs
- ▶ Chapter-by-chapter
- ▶ Disability-by-disability
- ▶ Device-by-device

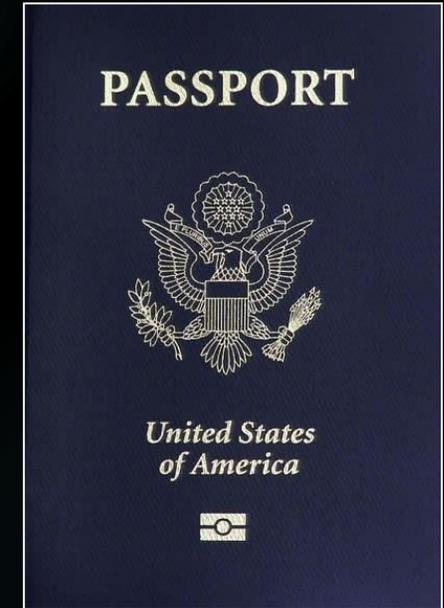
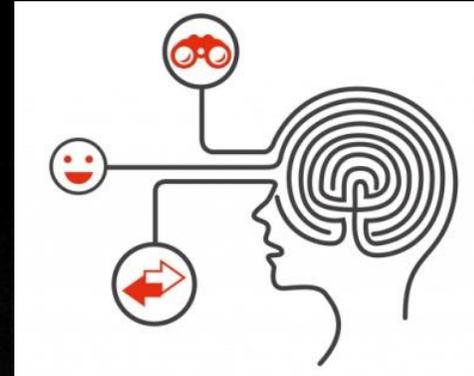


$$e^{i\pi} = -1$$

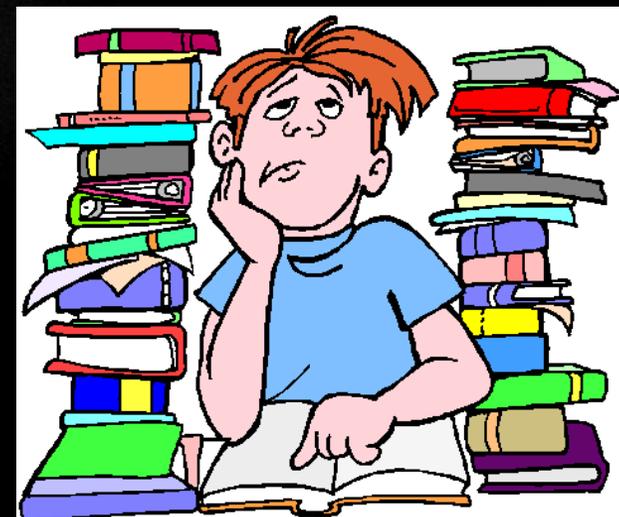
The only equation you may see

# What this Course isn't

- ▶ Not a d.school course
- ▶ Not a course in Design Thinking or Product Design
- ▶ Not just about good ideas and using Post-it notes
- ▶ Not about starting a company
- ▶ Not about commercializing a device or product
- ▶ Not about business or marketing or manufacturing
- ▶ Projects typically not with big companies or in foreign countries
- ▶ No finals, exams, problem sets, or quizzes
- ▶ No books to buy
- ▶ Some weekend reading - 5 minutes
- ▶ No boring lectures



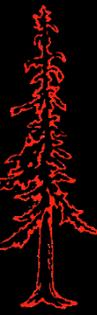
"Not that there is anything wrong with that"



# What this Course isn't

No in-class instruction in:

- ▶ Tool use
- ▶ Fabrication techniques
- ▶ 3D printing
- ▶ Laser Cutting
- ▶ Mechanical systems
- ▶ Electronic & Mechatronic systems
- ▶ Selection of materials
  
- ▶ Report writing
- ▶ Presenting
  
- ▶ Time management



# What this Course is



- ▶ Technology and people
- ▶ Assistive Technology in its many forms
- ▶ Engineering design-development process:
  - ▶ Fully understand the problem
  - ▶ Brainstorming
  - ▶ Prototyping, testing
  - ▶ Refining, iterating
  - ▶ Communicating
- ▶ Working on a project
- ▶ Engaging with local community members
- ▶ Previewing your professional life



# Course Credentials

- ▶ Certified Service Learning Course [**Cardinal Course**] (Haas Center for Public Service)
- ▶ Approved course for **ME undergraduate** degree (*Handbook for Undergraduate Engineering Programs 2010-2011, page 308, note 7*)
- ▶ Can be approved as an elective for the MS degree in ME by a faculty advisor
- ▶ Approved for the **Program in Science, Technology & Society (STS)** - included on the BS Major STS Core list in Social Scientific Perspectives area of the Disciplinary Analyses section
- ▶ Approved for **HumBio Program** and **Symbolic Systems**
- ▶ Approved for **Learning, Design and Technology (LDT)** in the Graduate School of Education
- ▶ Listed as one of two "**Save the World**" Winter Quarter courses on *The Unofficial Stanford Blog*



« Pasadena-Bound? A Government We Deserve? The Meaning of Tuesday's Elections »

## TUSB 2011 Winter Course Guide: spice up your courseload!

Posted by Kristin on November 5, 2010 1:10AM



Stanford: land of sunshine-y studying all year round

It's that time of year again! Not sure what winter classes to take? No worries; check out TUSB's course primer. Whether you're looking to satisfy a GER, find profound inspiration, or just take a fun class for **kicks**, we've got you covered.

If there's anything we missed, don't hesitate to mention it in the comments – we appreciate your feedback. Additionally, you can check out past years' course guides **here**. **Enjoy!**

**Shake Your Groove Thing:** what

better way to **shake off** the winter doldrums (literally) than with some fun dance classes? Here's a small sampling of the Dance Department's awesome offerings.

- **EESS 105: Food and Community for a Sustainable Future** – from garden development to food dispersal to the needy
- **ENGR 110: Perspectives in Assistive Technology** – team-based projects for the disabled

**Burst the Bubble:** field trip-based



Welcome to the Farm

search

 Search


The Unofficial Stanford Blog

Like 730

announcements:

The Procrastination Nation photo contest is over! Watch for the post with the winning entries.

popular this week

- » Big Game Tickets Available
- » A time to be thankful...
- » Overheard at Stanford...

a word from our sponsors

recent comments

» C.J. on This Week in Stanford 11/7/10-11/13/10

"How wonderful it is that nobody wait a single moment before starting to **improve the world.**" - Anne Frank



"Save the World"?  
- or -  
"Change the World"?

How many people do you have to save?



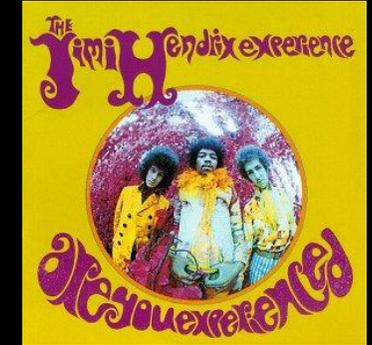
# Course Structure



- ▶ A **twice-weekly in-person in-classroom sessions** exploring perspectives in the design and use of assistive technology by engineers, designers, entrepreneurs, clinicians, and persons with disabilities - a field trip, a film screening, and an assistive technology faire.
- ▶ Opportunities for **thought, reflection, and discussion**
- ▶ A **project experience** that includes problem identification, understanding, brainstorming, design, fabrication, testing, and reporting - benefitting individuals in the local community



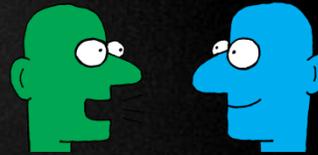
# Student Experience



- ▶ Gain an appreciation for the **social, medical, and technical challenges** in developing assistive technologies
- ▶ Learn about assistive technology concepts, design strategies, ethical issues, and **interaction of people with technology**



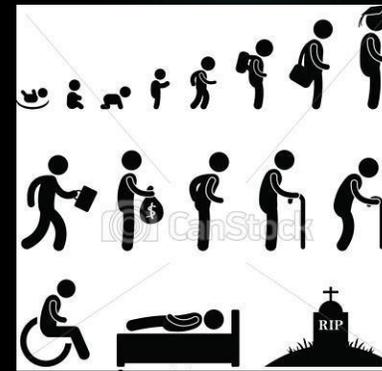
For students working on a team project:



- ▶ Engage in a comprehensive **project experience** that includes working with real users of assistive technology to identify challenges, prototyping solutions, performing device testing, practicing iterative design, and communicating results
- ▶ **Employ engineering and design skills** to help people with disabilities and older adults increase their independence and improve their quality of life

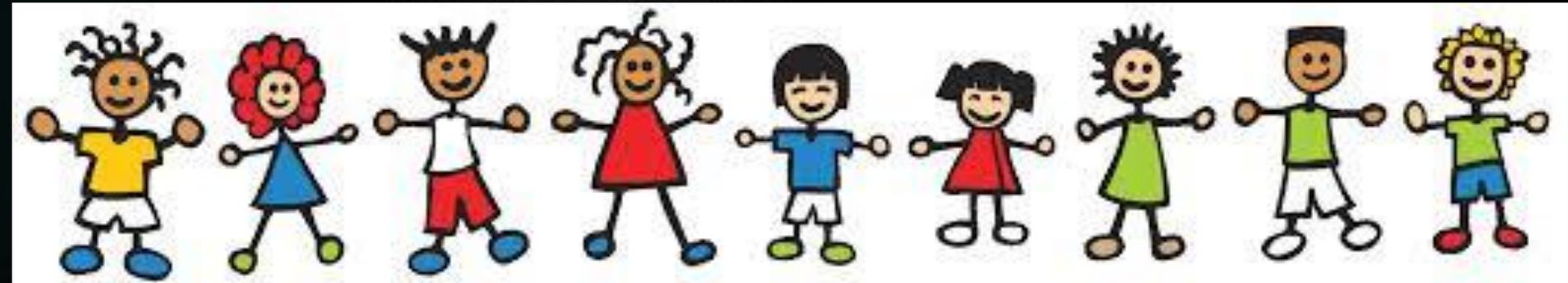


# Your Experience

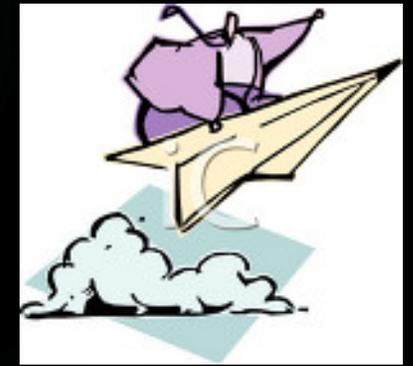


How does this course fit into your life and education?

- ▶ not reliving past experiences
- ▶ not just another course
- ▶ previewing your future professional life



# Credit Options



1-unit options:

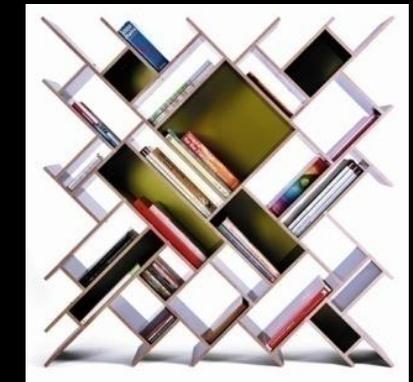
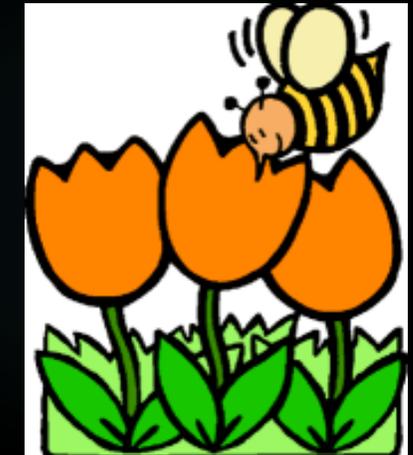


▶ **No letter grade (CR/NC)**

- ▶ Attend **at least 15** ENGR110/210 lectures (including this one)
- ▶ No participation in a project

▶ **Letter grade or CR/NC**

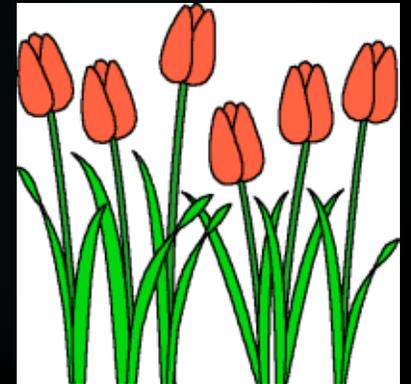
- ▶ Attend **at least 15** ENGR110/210 lectures (including this one)
- ▶ Pursue a project: interview an individual with disabilities and
  - ▶ research an assistive technology topic,
  - ▶ paper design of an assistive technology device,
  - ▶ create of a work of art,
  - ▶ engage in an aftermarket aesthetic design, or
  - ▶ engage in an aftermarket functionality / usability design
  - ▶ consider a project from the Candidate Individual Project List
  - ▶ optionally work with another student during the "Understanding the Problem" activity



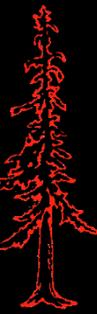
# Other Options



- ▶ Optionally, continue with **independent study** (ME191 or ME391) effort in the Spring or Summer Quarter (with approval of your faculty advisor)

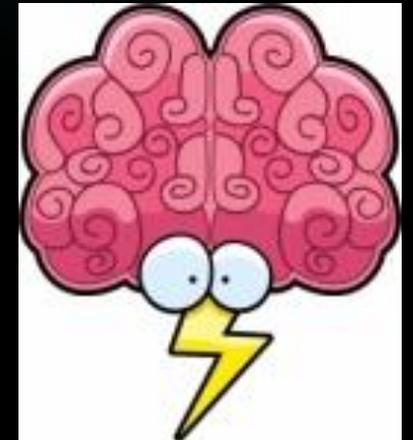


# Project Activities

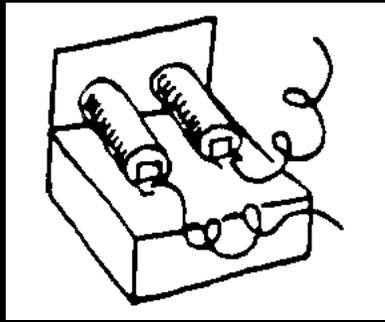


For those working on a **team project**:

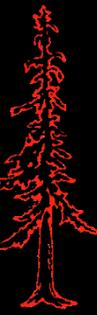
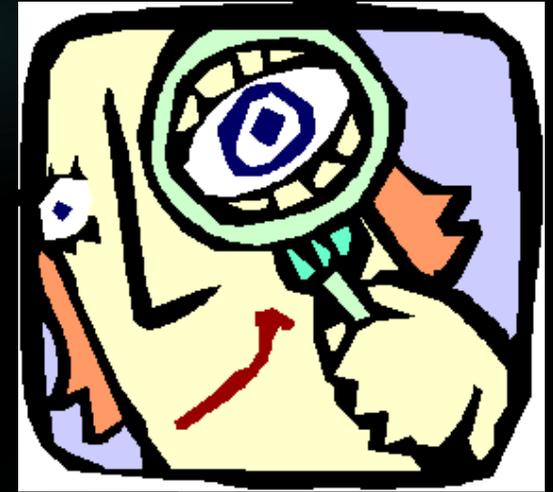
- ▶ Review candidate project descriptions & listen to team project pitches on Thursday
- ▶ Select a project & form a team
- ▶ Investigate **project problem** with an individual with a disability
- ▶ Evaluate the situation to **fully understand the problem**
- ▶ **Gather relevant background information** for the project, including any prior design approaches and commercial products
- ▶ Brainstorm, evaluate, and choose a **design concept**
- ▶ Prototype, fabricate, test, analyze, and refine the design
- ▶ **Present and demonstrate the design** - giving background, criteria, initial concepts from brainstorming, selected design candidate, and any prototyping, fabrication, and testing
- ▶ Submit **final report** and **reflect** on the project experience



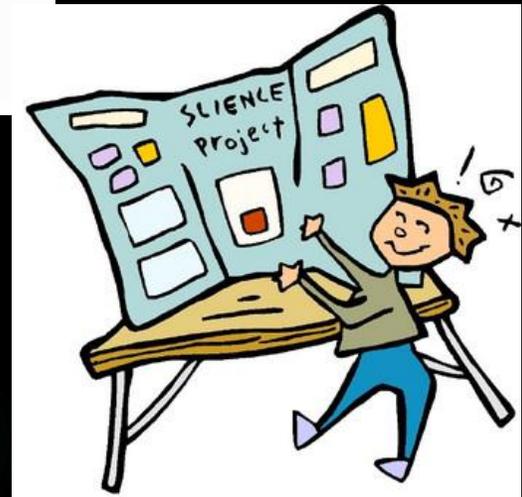
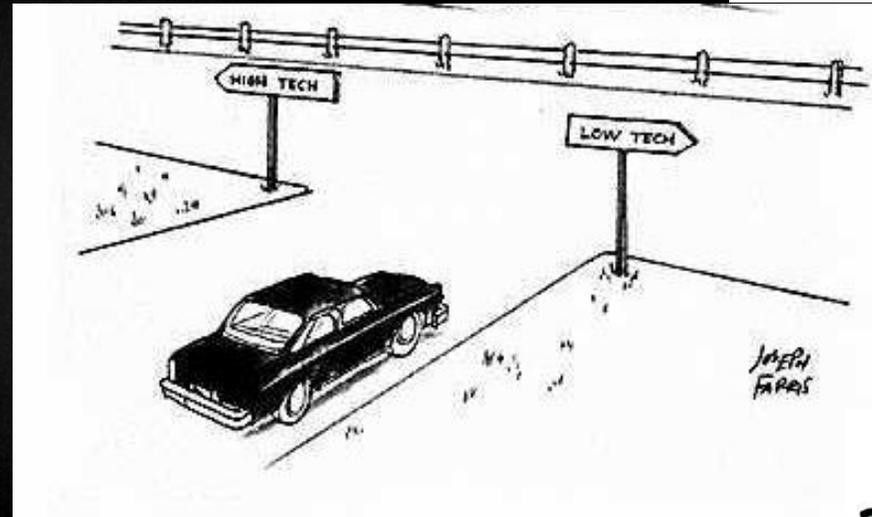
# Projects



Thou shalt prototype  
- Larry Leifer

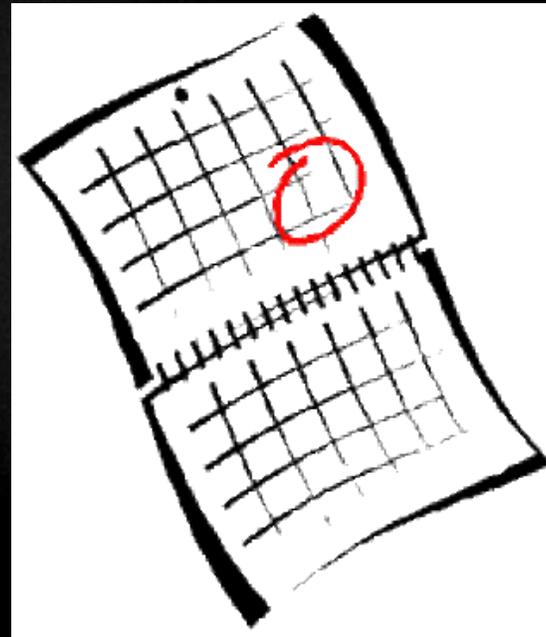
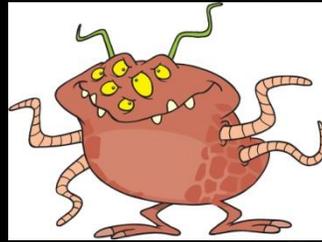


- ▶ “Building people” not projects - Prof Larry Leifer
- ▶ “Problem first” or “Technology first”
- ▶ 8-week prototypes
- ▶ Need not be ready-to-market
- ▶ Low tech solutions are ok
- ▶ Solution benefitting one person is ok
- ▶ Experiencing the engineering design process and demonstrating prototype functionality are priorities

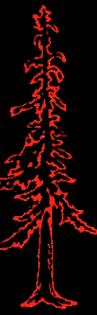


# Your Project Team is Like a Company or Start-Up

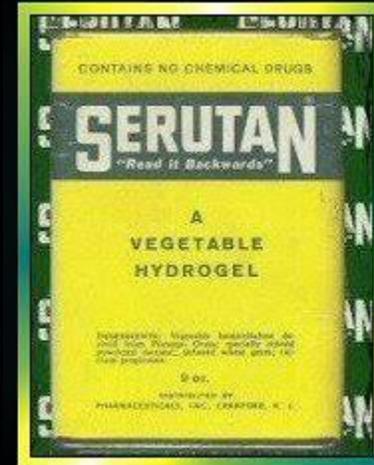
- ▶ Team members
- ▶ Resources
- ▶ Deadlines
- ▶ Budget
- ▶ People to please / report to
- ▶ Problem to address
- ▶ Goal



# Project Team Identification



- ▶ Team name
- ▶ Team logo / icon
- ▶ Project title
- ▶ Device name
- ▶ Catch phrase



Serutan is "Nature's" spelled backwards



# Why you may want to



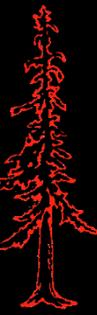
If you have enrolled for three credit units, you may want to consider taking the course for one unit or waiting until next year if:

1. You are not graduating, or
2. If you have very limited fabrication experience, or
3. Good time management skills are required if you are taking other project courses such as ME112, ME170, ME203, ME210, ME218, ME310, BioE141, or ...,
4. If you have to miss many lectures, or
5. You are not able to devote at least 5 hours per week to your project.

Take it  
twice!

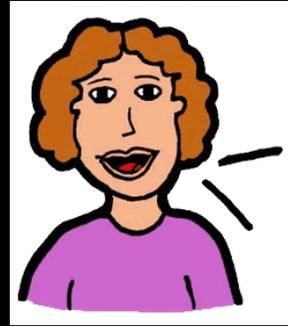
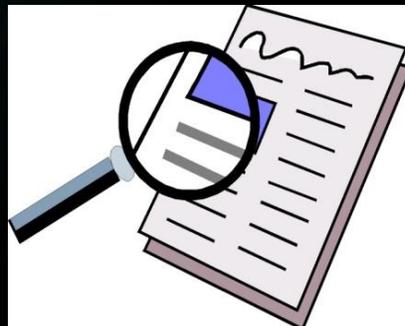


# Assignments

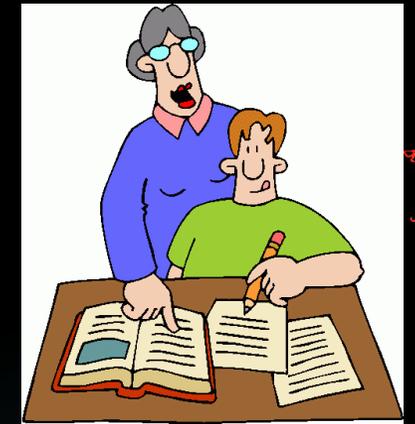
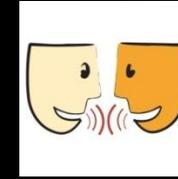


For those working on a **team project**:

- ▶ Mid-term Presentation & Report
- ▶ Communicate team's project progress **weekly**
- ▶ End-of-term Presentation, Demonstration & Report
- ▶ Reflect individually on your personal project experience

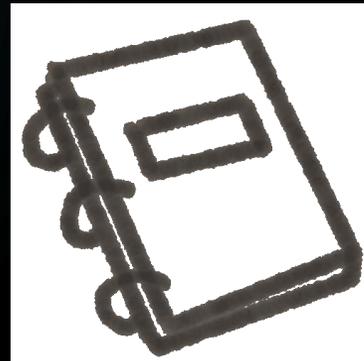
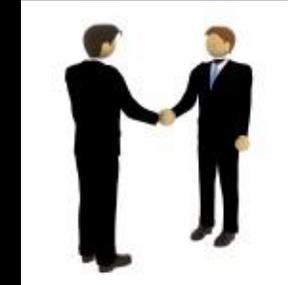


# Assignments



For those working on an **Individual Project**

- ▶ Meet with Dave to agree on a project
- ▶ Communicate your project progress **weekly**
- ▶ **Individual Presentation and End-of-term Report**
- ▶ Reflect on your personal project experience

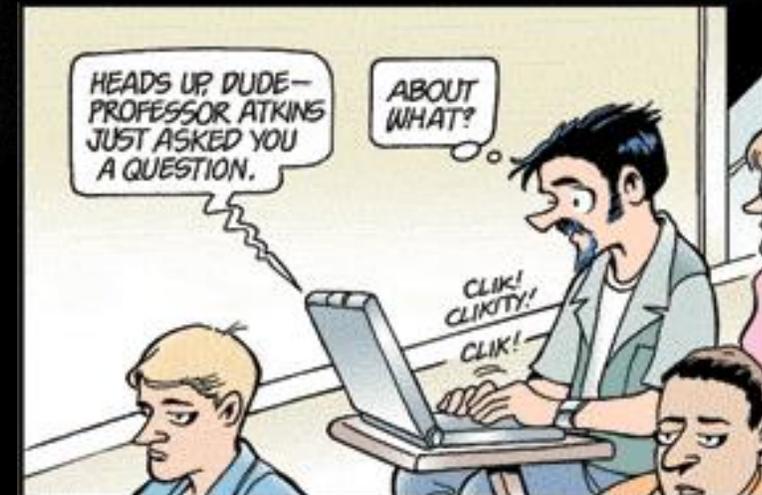
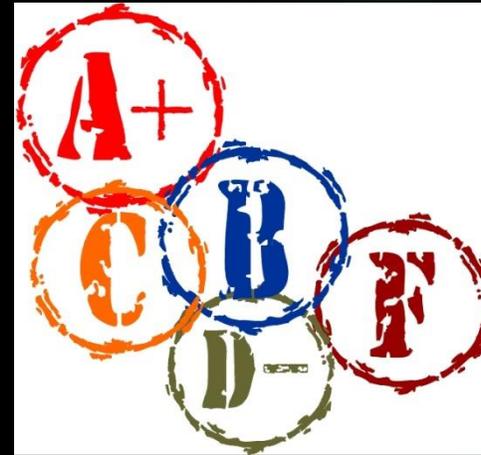


# Grading

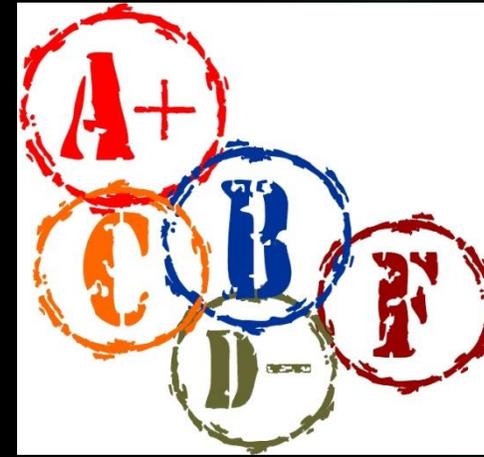
For those working on a team project:

- ▶ Mid-term Presentation 10%
- ▶ Mid-term Report 10%
- ▶ End-of-term Presentation 20%
- ▶ End-of-term Report 20%
- ▶ Prototype Design & Functionality 20%
- ▶ Project Suggestor's Feedback 10%
- ▶ Participation 10%

Participation includes actively listening, posing questions to speakers, **engaging in class discussions**, verbalizing thoughts & analyses, and communicating project progress.



# Grading

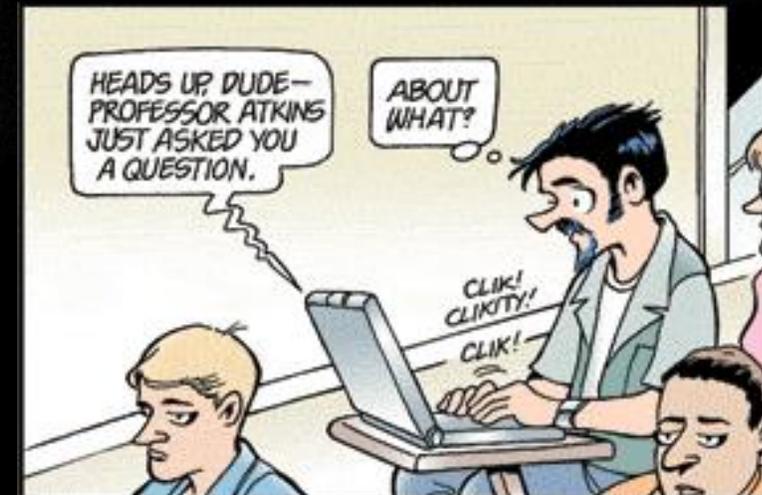


For those working on an individual project:



- ▶ End-of-term Presentation 45%
- ▶ End-of-term Report 45%
- ▶ Participation 10%

Participation includes actively listening, posing questions to speakers, **engaging in class discussions**, verbalizing thoughts & analyses, and communicating project progress.



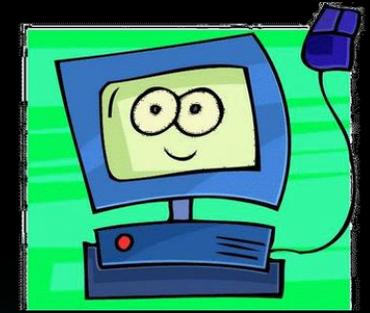
# Optional Follow-on Activities: Independent Study or SURI (ME)



- ▶ Continue brainstorming additional design approaches
- ▶ Evaluate the approaches and select one to pursue
- ▶ Prepare an updated design proposal
- ▶ Perform detailed design and analysis
- ▶ Prepare a midway report
- ▶ Build a first cut prototype to demonstrate design feasibility
- ▶ Test the prototype and get feedback from users
- ▶ Redesign as necessary
- ▶ Construct a second, improved prototype
- ▶ Pursue re-testing and get feedback
- ▶ Prepare a final report documenting the results of a project and suggesting steps to further develop the design

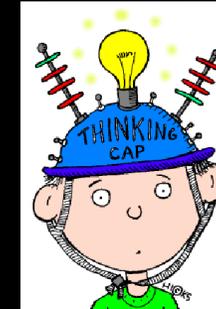


# Discussion Topics



- ▶ Who is Disabled?
- ▶ The Upside of Failure!
- ▶ Antique technology
- ▶ New technology
- ▶ AT device review
- ▶ Famous people with disabilities
- ▶ Assistive robotics
- ▶ Student request

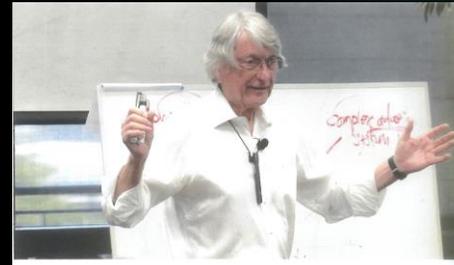
- Video theater
- Everything is a prototype / AT
- In the news
- What would MLK say about AT?
- Ableism, Ageism & Allyship
- Ethical dilemmas
- Marketing terms
- Accessibility
- Product costs



# Guest Lecturers & Panelists



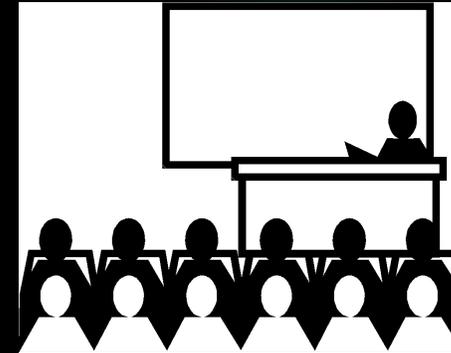
# Project Suggestors



“Who’s your *USER*?”



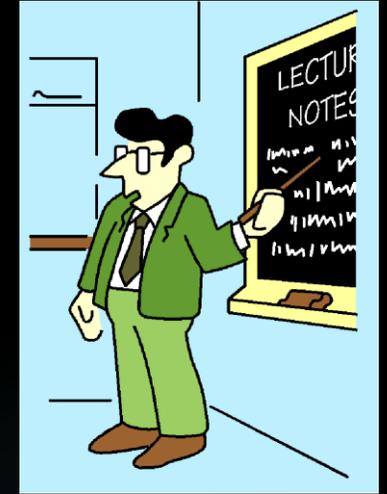
# Lecture Titles 1 of 2



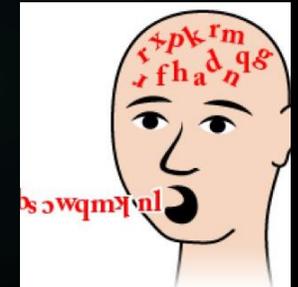
- ▶ Course Overview & Introduction to Assistive Technology
- ▶ Project Pitches & Team Formation
- ▶ Creating Assistive Technologies - Understanding the Problem
- ▶ Bridging the Gap between Consumers and Products in Rehabilitation Medicine
- ▶ Perspectives of Stanford Students and Faculty with a Disability
- ▶ The Design and Control of Exoskeletons for Rehabilitation
- ▶ Wearable Robotic Arms
- ▶ Brain-Computer Interfaces for Communication
- ▶ Issues of Human Interface Design in Prosthetics



# Lecture Titles 2 of 2

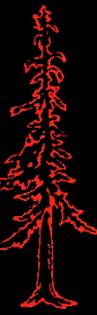


- ▶ Assistive Robotics
- ▶ Field Trip to Magical Bridge Playground
- ▶ Thoughts on Assistive Robotics
- ▶ Designing Beyond the Norm to Meet the Needs of All People
- ▶ Assistive Technology Faire
- ▶ From Idea to Market: Eatwell, Assistive Tableware for Persons with Cognitive Impairments
- ▶ Film Screening
- ▶ Wheelchair Fabrication in Developing Countries
- ▶ Student Team Project End-of-term Presentations
- ▶ Student Team Project End-of-term Demonstrations



# Lectures

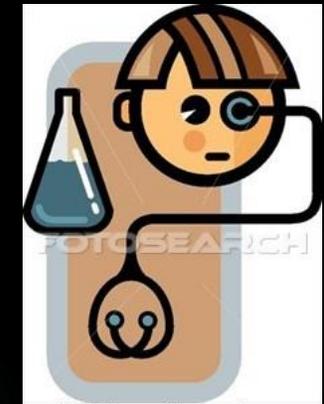
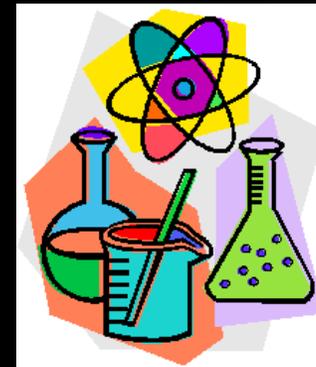
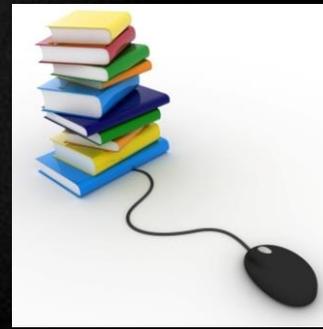
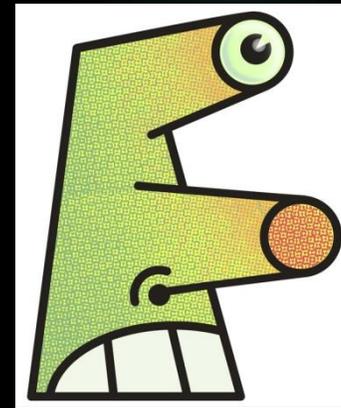
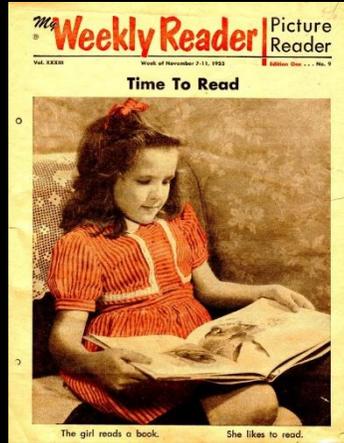
- ▶ Lecture topics are chosen for their interest, but may not relate to specific projects
- ▶ Some class sessions may run overtime - students will be given an opportunity to leave at 5:50pm



# Technology Tidbits

## Weekly Readings

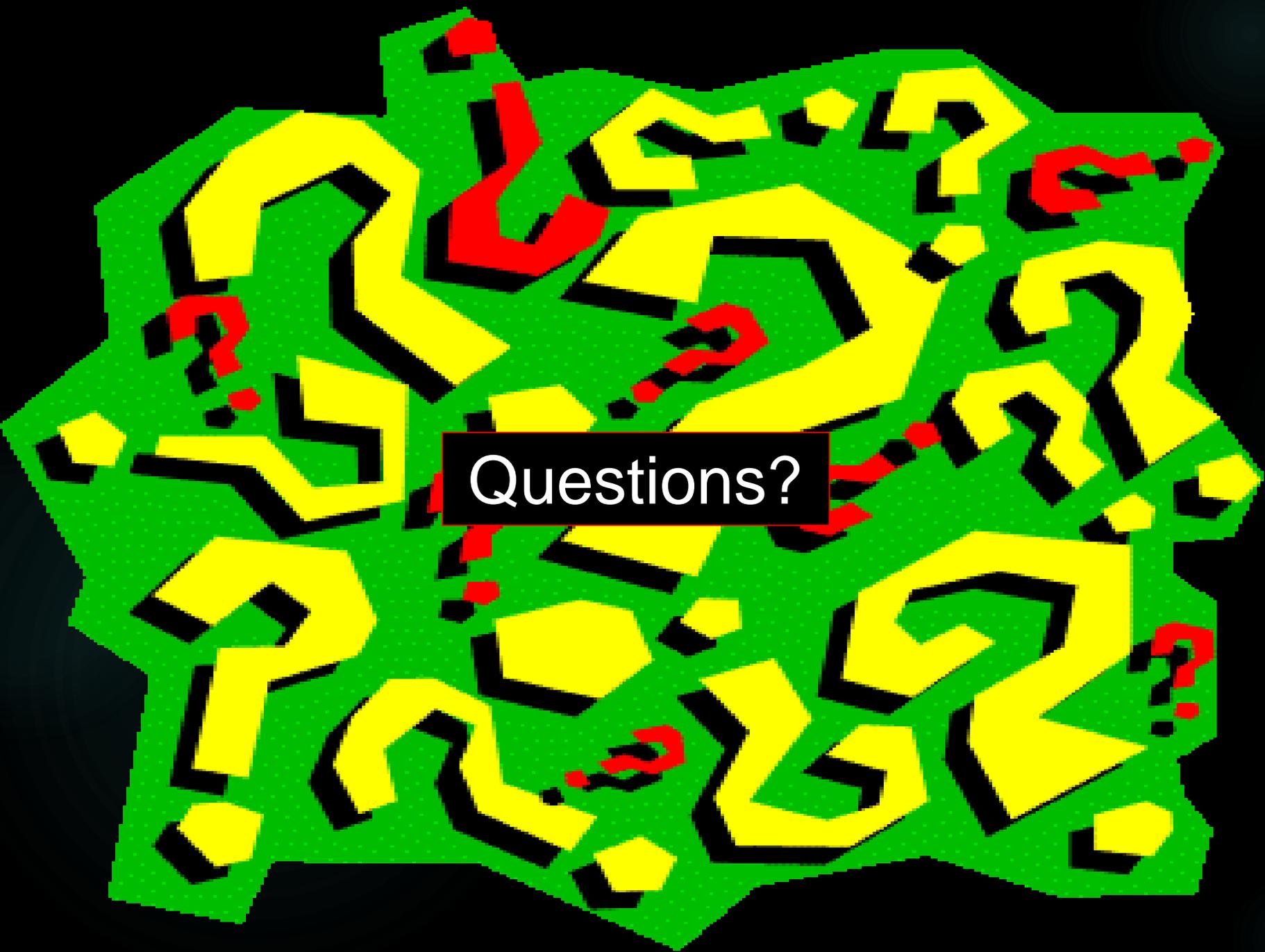
- ▶ New products
- ▶ R&D
- ▶ Interesting articles



# Tell Your Friends



Openings for 1 credit unit options



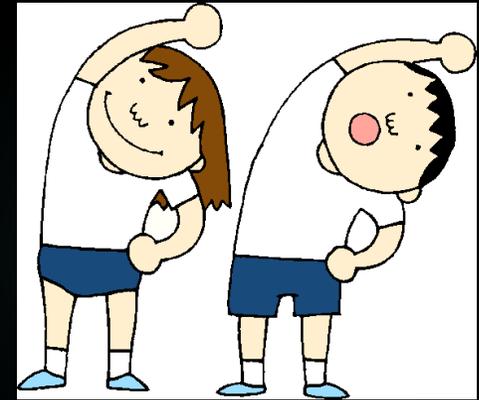
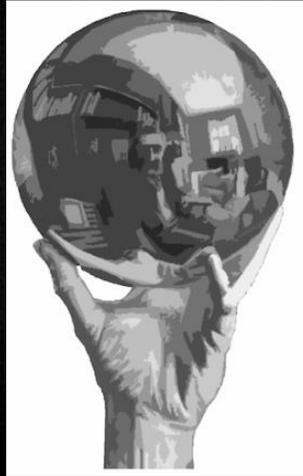
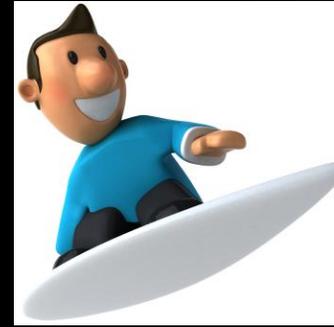
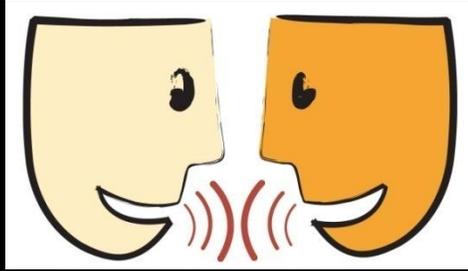
Questions?



QUESTIONS  
ANSWERED  
HERE  
EVEN THE  
SILLY ONES

# Break Activities

- ▶ Attendance sheet
- ▶ Stand up and stretch
- ▶ Take a bio-break
- ▶ Text message
- ▶ Web-surf
- ▶ Respond to email
- ▶ Talk with classmates
- ▶ Reflect on what was presented in class



# Short Break

