

Building the Best BME Intro Course

Instructions:

Fill in the sheet corresponding to your breakout room number.

Building the Best BME Intro Course:

What are you glad your BME Intro course teaches or what do you wish it taught?

+real world
community
partnership

- how
something
gets from the
prototype
stage to
product stage

--wish there
was more in
the process
past first
prototype
(regulations)

Elements that set
BME apart:
differences in scale,
work rooted in
empathy, intersection
between
physiology/tech
y

Can we design a
course around these
elements specifically?
e.g. medical case
studies that dive into
each level of the scale,
focuses on a different
bio/tech interface,
empathy/ethical
considerations, etc

Glad that it covers:
literature searching,
regulatory/IP, broad
survey of the field

Wish list: 1)
emphasis on design,
2) hands-on
projects/problems

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Glad: Data collection and analysis skills

Glad

MaxTraq

Glad we have hands-on activities

Matlab

Wish

Wet lab skills

Coding (MATLAB)

Glad we teach practical skills like MATLAB & CAD

Glad we cover societal issues through readings and discussions

Glad we develop practical skills like Excel and professional skills like communication and teamwork

Prosthetics and desire to help people (empathy) motivates many incoming students

Instrumentation or basic controls

Wish we did more physiological labs

Human physiology and labs where they collect data from their own bodies.

Literature searching and appraisal

Effective team strategies

Basics of experimental design

I wish they knew physics before entering the course.

Topic focus areas within BME

3D printing and CAD

I wish we had more time for design, or creative exploration.

Breakout
Room #4

Building the Best BME Intro Course:

What are you glad your BME Intro course teaches or what do you wish it taught?

**CAD & 3D
Printing**

**Reverse
Engineering**

**Semester
long
design**

**Cell
Culture**

**Global
Health**

**Need
More
Ethics**

**Risk
Assessment**

**Human-
Centered
Design**

**510k
Pathway**

Building the Best BME Intro Course:

What are you glad your BME Intro course teaches or what do you wish it taught?

What does a career in BME look like?

If General Engineering Intro course institution-wide, could a BME-focused intro course include BME-focused problem statements/projects/ethics case studies?

Communication Skills in Interdisciplinary field (EE, ME, Bio, Chem, etc)

what's the goal of an intro BME course?

- Hook?
- Disciplinary Skills/Knowledge?
- Textbooks?

- Provide scope of possibilities BME careers
- What can [Institution] BME do for students? --> marketing

Breakout
Room #6

Building the Best BME Intro Course:

Design course
- how it
changes over
curriculum

Faculty talking to
intro BME students.
Students meet
faculty and see the
breath of the field.

**More
prototyping
and iteration
needed early
in the
curriculum.**

**Problem
solving skills
and
programming**

re you
BME I
se teaches or what do
u wish

Building the Best BME Intro Course:

What are you glad your BME Intro course teaches or what do you wish it taught?

Wish: A nod to ethical considerations of BME.
(General/OSU/University of Penn)

Wish: **Basic/Tool-like for field specific problem solving.** (OSU)

Idea: The course should focus on troubleshooting/problem-solving instead of content.

Do: Teach teamwork, ethics, problem solving, hands-on.
(University of Maine)

Question: How do you introduce students to the entire spectrum of the field (micro to macro)?

Do: Hands-on projects. Put devices together as part of the course. Something to brag when coming home/peers and builds the identity of students as BME
(University of Maine).

Solution*:
Possible structure the course from a nano to macro

eract
drip
MD to
om an
ttle
extremely practical. (Univ

Building the Best BME Intro Course:

Share your favorite Intro-level BME assignment and what you like about it.

We do a lot of Fermi problems throughout the semester to practice estimation

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**Finite Element
Analysis &
Computational Fluid
Dynamics - Improve
Prosthetic Design**

**Introduce Bioethics
Discussions (e.g.,
Jurassic Park Novel);
Connect to CRISPR,
Gene Therapy, etc.**

**Design and
Concept
Generation
toward Global
Health
Challenges**

**Conceptual Design
of Device to Help
Someone They
Know (Customer
Needs, Current
Projects, etc.)**

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Write a problem statement. Write 3 problems.

3 oral presentations over the semester. Have students discuss what they enjoyed about the presentation? Not just instructor feedback.

Problem-based-learning format. Take apart a medical device and draw it up in CAD. Try to present to a K-5 audience. (Pulse ox, BP cuffs,...)

Team-based design. Need finding, prototyping. Broad vague problems that students are surprised they are able to achieve.

Classtime to bring in faculty and alums from companies to introduce their jobs/research.

Spotlight chats: have BME in industry to give 5-10 minutes intro of their job. Asynchronous chat on Slack

Breakout Room #4

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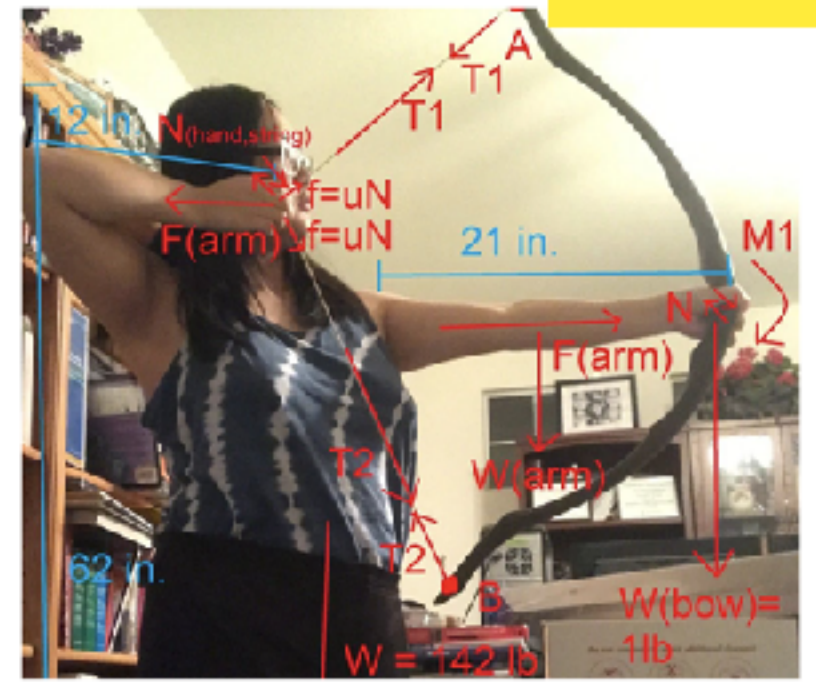
Fabricate an ECG connector to comply with a med device standard.

Empathy quiz:
https://greatergood.berkeley.edu/quizzes/take_quiz/empathy Have students take and reflect

about a rock climber who lost his own legs and went into prosthetics design, lots of empathy and importance of multiple disciplines to tackle complex problems, and also ethics of accessibility of technology. Good

importance of multiple disciplines to tackle complex problems, and also ethics of accessibility of technology.

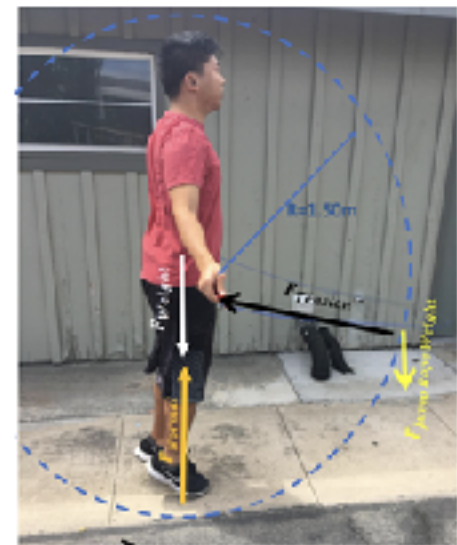
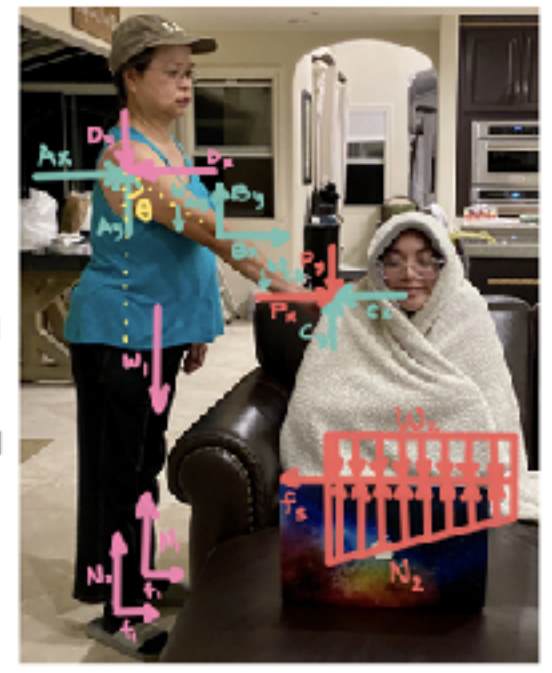
Good transition between biomechanics and bioinstrumentation, and lots of excitement about medical device design and using bme to help people.



concepts for the pertinent topics that will be used in the course... Improving communication skills amongst the community in the class for improved group work/presentations/case study/ethics

Ethics case study:
<https://ieeexplore.ieee.org/document/5673545> (Also makes a good ABET Outcome Portfolio item)

My mom is trying to get me to stop watching Netflix during quarantine. She tries to push me off of the couch, where I permanently reside. Assume that my mom is static and rigid and the vertical component of the push force has a magnitude of 10 N directed downwards. My mom weighs 55 kg, while I weigh 45 kg. The coefficient of static friction between my skin and the couch leather is 0.8. With what horizontal force directed to the right will I begin moving? Will I slide or tip? What are the magnitudes of the other forces acting within/on my mom?



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mini grant
writing at end
of design
project

hands on
device usage
on models
(e.g., tissue
models)

Career
exploration
via visiting
lecturers

CA
company:
Equalize
Health

Identifying medical
devices on search and
rescue Hummers
(actually going inside
and identifying 5
systems to level 1).
Partnering with ER
doctor. Feedback was
that need to show
trends on devices, not
just momentary data
display

10 times the number
of glucose
molecules in a drop
of blood than it
needs to make a
reading. Assume
that the glucometer
reading is 100mg/dL.