OUTREACH OUTLINE

Required Materials:

- *Chalkboard or large paper* to write down student ideas, definition of BME (in bold below), and design matrix grid
- *Large markers/chalk* to write with
- *4 to 5 video game controllers* having distinct characteristics:
>   i.e. varying between early Nintendo controller (extremely basic) and brand new Wii or Xbox controller (sophisticated)
- *Individual design matrix sheets* for each group of students (please see outreach overview)
- *Design project poster* (to present to the class if time at the end)

Presentation/Activity:

I.   **Introductions**
   a.   Self (name, where from)
   b.   Group: Senior biomedical engineering students at UW-Madison
   We're here to talk to you about what biomedical engineering is and all of the really cool things that biomedical engineers do!

II.   **Define BME**:   What comes to mind when you hear the words "biomedical engineering?"
   a.   Ideas on board:

> *Examples!*
> medical imaging   prosthetics   organ transplants
> drug delivery systems   artificial organs & tissues
> laparoscopic surgery   LASIK   medication dispensing
> devices for persons with a disability (motor or sensory, or cognitive)
> diabetes monitoring

   If no ideas, let's break it down: Give us anything related to any of these words (bio, medical, or engineering)
   b.   Good ideas! – they all fit into the broad definition of BME:
>   **"The application of science and technology to solve problems in biology and medicine."**

III.   **Activity: BRAINSTORMING/DESIGNING**
   First activity = **Brainstorming** w/ candy
   - A big part of BME at Madison is a set of classes where we learn how to design medical devices for doctors and companies...
   - We're going to lead you guys through the design process now:
>   - Everything starts with brainstorming, so we want you guys to help us brainstorm the best video game controller possible:
>>   > How do you want it to look? Feel? What should it do?
>>   (Don't be afraid to give us really crazy ideas! Do you want it to feed you popcorn? Control the lights or volume? Blow cold air on you?)
>>>   *Ideas on board*
>>>   *Divide into matrix categories:*
>>>   *- Functions   - Cost - Looks   - Ergonomics - Easy to learn*

   Second part = **Design evaluation in groups**
   - We're skipping the construction of rough prototypes now and pretending that these controllers are our alternative designs.

- We need to look at all of our alternatives and figure out which one our client prefers and/or the most people would actually want to buy!

Use pre-drawn matrix, add categories + controllers

> Each group gets a controller and rates it on a scale of 0-5
- Function: 0 = not cool, 5 means it can do a lot of cool things
- Cost: 0 = expensive! 5 = cheap
- Looks: 0 = ugly 5 = cool-looking
- Ergonomics: 0 = uncomfortable 5 = easy to use and hold
- Easy to learn: 0 = needs an manual   5 = could pick it up + use right away

> Tally results, best will be closest to max of 25
> Choose "final" design, talk about next steps (functional prototype, testing)

IV. **Life as a BME:**
  a.   You guys just helped us solve a design problem...
  BUT, that's not all BMEs do: there are several **main tracks** BME students can take
  - talk about our individual tracks, what those types of BMEs do
    1) Sara – Biomechanics
    2) Emily – Health Care Systems
    3) Michele - Biomaterials
  - bring up remaining tracks: Bioinstrumentation, Medical Imaging
  b. Now it may seem like a lot of these things that BMEs do are all **math and science related**, but within the engineering process, there are a lot of **different directions**:
    Raise your hand if:
    - you like doing creative things, or thinking of new ways to do things? → R&D (research and design) engineer!
    - you like to get your hands dirty/build things/take things apart? → Manufacturing
    - you like to convince other people that your ideas are right? Or if you like to work with other people in general … → Sales/Marketing!
    - you like doing experiments or if you are good at paying attention to details? → Testing/Validation!
  We've just brought up a bunch of things you guys could do in industry (working at a business right after graduation), but **BMEs actually end up in a lot in a lot of areas**:
    - industry (GE, 3M)
    - grad school (take more classes [usually things no one else is learning about anywhere] and leading their own research)
    - medical school (at least 4 more years of school, but can become anything from a dermatologist to a surgeon)
    - OR a totally different field: law school, business school, etc.

V. **Our senior design project** (if time):
  - Biology component (understand asthma + medications)
  - Electrical component (circuit – temperature sensing)
  - Computer programming ("brains")
  - Mechanical component (automatic inhaler shaking + pushing down)