

# “How It Works”

Technology is regularly used by clinicians and researchers to measure indicators of exercise. Engineers, particularly biomedical engineers who operate at the interface of medicine and technology, are well suited to develop technology for these purposes. **One of my goals for you in this course is to be able to explain how technology used to measure exercise works (SLO2).**

**For this assignment, you will work with an assigned group to prepare one video blog post for our course site (<http://sites.udel.edu/coe-engex/>) and lead an in-class discussion.**

This assignment is worth 15% (BMEG442) or 10% (BMEG667) of your final course grade.

## Video Post (62%)

Your assigned group will together sign up for one topic from the provided list. Topics may not be duplicated. Each topic has a corresponding due date, which are spread throughout the semester. Video posts are due uploaded to our course blog on Tuesday evenings by 11:59pm.

Create a video that describes how your piece of technology works. Aim for 6-8 minute video, but no longer than 10 minutes. Convey to your audience the following:

1. Who uses this technology and why; use layperson language
2. What this technology measures physiologically; use scientific/anatomical/physiological language (for example, don't just say it measures heart rate, explain what heart rate is and what physiologically is happening to produce a measureable signal)
3. How the technology works- the engineering behind it; use technical, engineering language and apply relevant engineering principles/concepts/equations
4. (if applicable) Compare/contrast different technologies used to measure the same indicator- describe the pros/cons of each, compare accuracy
5. What conclusions can be drawn from this technology and what its limitations are

**Audience:** Expect your audience to be a technical audience that is not familiar with your specific technology (think: senior undergraduate engineering majors). This means you want to start broad, motivating the use of this technology and then get into the technical specifics regarding physiology and engineering principles.

**References:** You are expected to cite any work that is not your own, including video or audio clips. Beware of copyright infringement. Seek sources that are Creative Commons Licensed. You should also have written, signed consent if you are planning on filming people. An example release form can be found here: <http://guides.lib.udel.edu/c.php?g=85590&p=548977>

In addition to your video, your blog post should include a hyperlinked “Recommended Further Reading (or other Resources)” works cited list so your audience has a reading list to consult.

**Your Brand:** Remember, your post is public, and anything public means you have an opportunity to build your brand. You probably want your brand to represent quality, so although your video is allowed to be simple, it should still be high quality (smooth transitions, not grainy or noisy, etc.). You also need to make sure the content of your video is accurate.

**Category:** Mark your post using the category “How It Works...” and tag with relevant keywords.

**Student Multimedia Design Center:** <https://library.udel.edu/multimedia/>

UD's Student Multimedia Design Center will be a valuable resource for you. They have equipment, software, and expertise. Online, they also offer advice and guides for creating multimedia productions: <http://guides.lib.udel.edu/multimedia>

## Example Videos

Here are three different examples of videos that describe how polygraphs (lie detectors) work:

- A. <https://www.youtube.com/watch?v=cdx1aT2e5yc>
- B. [https://www.youtube.com/watch?v=t4SP\\_mYh4wQ](https://www.youtube.com/watch?v=t4SP_mYh4wQ)
- C. [https://www.youtube.com/watch?v=po\\_DCBGExP4](https://www.youtube.com/watch?v=po_DCBGExP4)

Video A: The first video gives a good basic introduction to the topic by defining terminology. It also explains limitations of a polygraph and what conclusions can be drawn.

Video B: The second video better explains the physiologic response than the first video. The second video also shows the most visual appeal by combining different pieces of media.

Video C: The third video explains who uses a polygraph, why, and how to operate it.

However, none of these videos describe the engineering principles behind the technology, so I expect you to be more technical than any of these videos are.

## In-Class Lesson (38%)

On the Thursday following your Tuesday video post due date, you will lead a 15 minute in-class lesson on how your technology works. Your classmates are expected to watch your video in advance, which is why it is critical that you adhere to the Tuesday due date. Your in-class lesson is expected to be more in-depth and technical than your video; your audience here is your classmates (who will have already watched your video). Don't regurgitate your video; add to it. Your in-class lesson should complement your video.

Your duty is to teach your classmates the engineering principles behind how your technology works.

- Relate your previous engineering coursework (this course and/or other courses you've taken) to the technology. I'm looking for technical content here; that mean equations, graphs, principles, etc. (!).
- Prepare and distribute a handout that lists the metrics (constraints and wants) that you think the technology adheres to; justify these metrics. Include relevant engineering standards. You may choose a particular brand of that technology, if appropriate, to help focus your metrics. Consider sources like data sheets and company websites to help you arrive at these metrics.
- Clearly define your lesson objectives. Your lesson should be more interactive than a traditional lecture. You can format your 15 minutes in whatever way you think is appropriate- slides, handouts, quiz, notes, dialogue, activities (individual, group), problem solving, game, etc. I'm looking for a rich, interactive experience that engages the whole class, but you have creative license to get your objectives across in whatever way you think is most effective and engaging.
- Separately, submit to Canvas 3 potential quiz questions and accurate solutions that could be obtained through your video and/or the in-class lesson. These may be incorporated into a future quiz.

### “How it Works” Video Post Rubric

	<b>Exemplary [A]</b>	<b>Proficient [B]</b>	<b>Developing [C]</b>	<b>Poor [D]</b>	<b>Missing</b>
<b>Introduction</b>	Clearly and concisely describes who uses this technology and how; appropriate layperson language is used; motivates need for technology [10]	[8]	[7]	Purpose of technology is poorly described and language is inappropriate for audience [6]	[0]
<b>Physiologic Processes</b>	Explains what physiological indicators this technology measures, specifically describes how that indicator is measured (what physiologic process is happening to produce a measureable signal), and explains how this indicator relates to exercise; is explicit in physiologic, anatomic, scientific language [20]	[17]	[15]	Description of physiologic indicator is vague, does not specifically describe the physiologic processes that produce the measured signal, and terminology used is not scientific [13]	[0]
<b>Engineering Principles</b>	Thoroughly, clearly, and concisely explains how the technology works and the engineering behind it; uses technical, engineering language; applies relevant engineering principles; if appropriate, compares and contrasts different technologies used to measure the same physiologic indicators of exercise [20]	[17]	[15]	Begins to relate engineering principles to the technology but does not provide depth; language is not precise technical language appropriate for audience; if appropriate, missing compare/contrast of different technologies used to measure the same physiologic indicators of exercise [13]	[0]
<b>Conclusions</b>	Analyzes the conclusions that can be drawn from this specific piece of technology; discusses the limitations of the technology (when the readings from this equipment may not be valid) [10]	[8]	[7]	Limited analysis of the limitations of this technology and its validity; superficial exploration of the conclusions that can be drawn when using this technology. [6]	[0]
<b>Video Quality</b>	Video is professional in quality, including clear purpose, structured organization, edited to include only high quality shots with smooth transitions, crisp audio and visuals, and creative, engaging media. [5]	[4]	[3.5]	Low quality video lacking structure and with poor organization, noisy audio, messy visuals, and minimal creativity. [3]	[0]

### “How it Works” In-Class Lesson Rubric

	<b>Exemplary [A]</b>	<b>Proficient [B]</b>	<b>Developing [C]</b>	<b>Poor [D]</b>	<b>Missing</b>
<b>Lesson Plan</b>	Clearly defined lesson objectives. Well-planned, focused lesson that is structured with a clear theme and good timing (15 min). Excellent familiarity with topic. [5]	[4]	[3.5]	Disorganized session with an unclear message that is too long or too short. Lacks familiarity with topic. [3]	[0]
<b>Engineering Analysis</b>	Relates and integrates previous engineering coursework (this course and/or other courses) to the technology; provides technical content and engineering analysis, such as relevant equations, graphs, etc. [13]	[11]	[10]	Relates but does not integrate prior engineering coursework; Superficial or inaccurate description of the engineering principles that apply to this technology; relevant equations/graphs, etc. may be missing or inaccurate [9]	[0]
<b>Metrics</b>	Prepares and distributes a handout that lists the metrics (constraints and wants) that the technology adheres to; metrics are justified with appropriate sources; relevant engineering standards are included. [13]	[11]	[10]	Provided list of metrics has obvious gaps in wants, constraints, or engineering standards; justification of metrics is poor and uses low quality resources [9]	[0]
<b>Engages Audience</b>	Keeps audience's attention. Lesson is more engaging than traditional lecture, incorporating multiple techniques to engage all students. Promotes a rich, interactive experience. [5]	[4]	[3.5]	Lacks effort to engage audience, resorting to a traditional lecture approach. [3]	[0]
<b>Quiz Questions</b>	Provides 3 potential quiz questions with correct solutions that could be found by watching the video and/or paying attention during the in-class lesson. [4]				[0]