Video Representation of Formulas

The fourth hour of ELEC390 will be used to create short videos to help other students understand basic formulas of electromagnetics by making short video tutorials about what the formula means. In brief over the course of the semester either individually or in teams of no more than two you will produce three separate one to two minute videos.

Project Requirements

You are to pick one formula from the supplied list for each of the first three course topic modules: transmission lines, fundamentals of electricity and magnetism, and energy propagation. You will create one short video for each module. Each video should help the audience to understand the formula by presenting multiple representations of the idea(s) or concepts it represents.

Multiple representations help people with different backgrounds or learning styles understand an idea. In other words some people understand formulas better, others find diagrams, animations, or a spoken representation more helpful. Your video must represent the formula in *at least* four of these ways:

- As a formula or set of equations.
- As a written definition or description.
- As an algorithmic construct like a flow chart or pseudocode that explains how the formula operates
- As a diagram, e.g. a schematic diagram.
- As a graph.
- The physical device(s) or phenomena that use the formula. In other words what does the formula help an engineer do?

The video should help your audience understand what the formula means by seeing it represented multiple ways. The target audience is undergraduates like yourself who are learning electromagnetics. The goal of the video is to teach, not to entertain. While you are encouraged to create fun and entertaining videos, the grade will depend upon how successfully the video is at communicating the concept accurately without introducing any misconceptions.

Since you are representing a formula, you should give your audience an appreciation of the magnitude of typical values, of how the formula behaves over a range of values, and some simple rules-of-thumb or heuristics so they can remember how to apply the formula. For example a simple heuristic for the speed of light is that light moves one foot in a nanosecond. Graphs are very useful in explaining how formulas change over a range of values.

Production Details

Each of the three videos must be from one to two minutes in length, no exceptions. Each video will be produced in three stages, with a grade assigned for each stage. For each video you will create a storyboard, a draft video, and a final video:

- Storyboard- A complete storyboard for the video is due two weeks before the video due date. 25% of video grade.
- Draft video- a full length, narrated video is due one week before the due date. The animations and materials do not need to be complete; use sketches from the storyboard or rough drawings. 25% of video grade.
- Final video- Complete video ready for public presentation. 50% of grade.

All storyboards and videos will be scored using the rubric on the subsequent page. You may use whatever materials you want, and are encouraged to be creative. The videos will be posted to both a public site as well as a Bucknell site; keep in mind that you are an ambassador for Bucknell. No offensive content is permitted. You must cite sources and not violate copyright. Any video that uses plagiarized material or copyrighted material without permissions will receive a grade of zero. You should use a Creative Commons license to protect your work.

Please choose a formula from the following lists for each video

- Video #1: Material in chapter 2. Choose from the following formulas (6^{th} edition): 2.39, 2.46, 2.53, 2.73, 2.84 and 2.93, 2.97, 2.104.
- Video #2: Material in chapters 4 and 5. Choose from any of the following formulas: 4.13, 4.19 and 4.21, 4.26, 4.29, 4.43, 4.51, 4.60, 4.63, 4.71, 4.79, 4.109, 4.121, 5.10, 5.22 and 5.24, 5.47.
- Video #3: Materias in chapters 6-8. Choose from any of the following formulas: any of Maxwell's equations in integral or differential form, 7.15, 7.32, 7.54, 7.66, 7.75, 7.77, 7.100, 8.12, 8.28 a or b, 8.32, 8.58.

Name _____ Video Title _____

	Exceeds Expectations		Meets Expectations		Below Expectations
Explanatory Power	o The presentation connects ideas together. o Video explains the formula accurately and succinctly.	Somewhere between exceeds and meets expectations	o The presentation and choice of the concept is correct but does not succeed in connecting ideas together. o Video explains the formula, but could have been more clear.	Somewhere between meets and below expectations	o The presentation and formula fails to connect ideas together, seems focused on recitation of facts, or is not relevant. o Little explanatory power.
Uses Multiple Valid Representations	o Uses more than four different representations. o The representations clearly explain the concept underlying the formula. o The representations are valid or potential misconceptions identified.		o Uses four representations. o The representations partially explain the concept underlying the formula. o The representations are mostly valid.		o Uses less than two different representations of the concept. Analogies are confusing and/or false.
Supports Learning for a Specific Target Audience	o The content is effectively targeted to undergraduate engineering students. Ideas the audience may not be familiar with are explained well and completely.		o The content of the video is appropriate for non-engineering students. The presentation generally reaches the target audience with a few lapses. Ideas the audience may not be familiar with are explained, but not always clearly.		o The content of the video is not appropriate for engineering students. Content has offensive elements. Ideas the audience may not be familiar with are not explained.
Tells an Interesting and Coherent Story	o Storyboard helped aid identification of resources o Little to no holes were found within the story. o Narration clearly has a well written argument with a strong thesis, introduction, body, and conclusion. o The pace (rhythm and voice punctuation) fits the story line and helps the audience really "get into" the story.		o Storyboard somewhat grasped the connection between images and audio. o Some holes were found within the story. o Narration captures some elements of an essay. o Occasionally speaks too fast or too slowly for the story line. o The pacing (rhythm and voice punctuation) is relatively engaging for the audience.		o Storyboard was not well thought out and did not visually represent connection between images, music, transitions, titles, effects, and/or narration. o Many holes in story were found. o Narration needs work and does not embody the elements of an essay. o No attempt to match the pace of the storytelling to the story line or the audience.
Technical Quality of Audio & Video	o Images create an appropriate atmosphere or tone and appropriately reflect and match narration. o Effects and transitions were used appropriately and consistently and aided in the development of story. o Audio of high quality and aligns with video.		o Images create an atmosphere or tone that matches some parts/narration of the story. o Effects and transitions were somewhat inconsistent or overused yet did not disrupt the overall message of the story. o Audio aligns with video but not of professional quality.		o Little or no attempt to use images to create an appropriate atmosphere or tone. o Effects and transitions were not used appropriately and were inconsistent or distracting. o Audio did not match video or was of such poor quality it detracted from viewing experience.
Appropriate and Engaging (Audience Rating)	o Rated highly by audience comments and feedback. Few negative reviews.		o Mixed reviews of the video.		o Feedback is predominately negative.

Comments:

For each video write down the presenter, the video title, the overall rating using the scale below (1-3), and then provide a ranking of each video from #1 (best video) to #13 (least favorite). Do not rate/rank your own video.

1 = I would probably not watch the video again or recommend the video to friends.

2 = I would watch it a second time, and some of my friends might find the video interesting or informative.

3 = I would watch the video many times and think most people would really find it interesting or informative.

Name	Video Title	Rating (1-3)	Overall Rank Order (1-13)