

Syllabus

Physics II: Waves, Electricity and Magnetism

Instructors:

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Co-Instructors: TBA

Dates of Course: Jan 25; Feb 8,15; March 1, 5, 22, 29, April 5, 12, 26; May 3, 10,17, 21, 24.

Note that March 5th and May 21st are Saturdays.

Evening meetings are scheduled 4:00 – 7:30. Saturdays are 9:00 – 4:30

Office hours: One hour before and after each course meeting and by appointment

Course webpage:

<http://activeteaching.org/moodle/>

All course information, assignments and resources will be posted here.

You must create a profile.

Catalog Description: Physics 2: Waves, Electricity and Magnetism

Waves, electricity and magnetism are major organizing principles of physics quite distinct from Newtonian mechanics. This is a contextualized content graduate level course offered to provide pre- and in-service teachers with the in-depth knowledge of waves, electricity and magnetism that is necessary for effective physics instruction in urban and other schools. This class will include content in waves, electromagnetism, electromagnetic radiation and optics. Each topic will be “contextualized” with the *Active Physics* curriculum that is used in many districts. In addition, there will be opportunities for laboratory investigations, historical and philosophical insights into the content as well as reflections and discussions on the best way to communicate this content to high school students given their backgrounds and the misconceptions research insights. There are no prerequisites for taking the course and it is open to all elementary, middle and high school teachers.

Objectives of the Course

Enduring understandings

- The world is orderly and comprehensible
- 4 Questions
 - What does it mean?
 - How do we know?
 - Why do we believe?
 - Why should I care?
- There are a few BIG ideas in physics and a few COMMON themes of all science
- There are multiple models for describing events and phenomena
 - Verbal
 - Qualitative
 - Mathematical
 - Graphical
 - Pictures

Essential Questions for each lesson

- What does it mean?
 - What is the description of the physics principles?
 - What models do we use to understand the event?

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- How do misconceptions arise?
- Why was this knowledge hard to come by?
- How do we know?
 - What evidence do we have?
 - Inquiry
- Why do we believe?
 - CRITICAL Analysis of Physics detector (CRAP detector)
 - Does not work mathematically
 - Conflicts with BIG ideas
 - Conflicts with common themes
 - How do we know this is universal?
 - What are the implicit assumptions in our belief ?
 - Occam's razor
 - Truth is beauty
 - The world of the heavens operates identically to the world of the earth
 - Falsifiability
 - You can't prove a theory but you can disprove it
 - Nature is the final arbiter
 - Logic
- Why should I care?
 - Find relevance
 - Use physics as a metaphor – pursue the metaphor
 - Transfer this knowledge to your interests and your life

Prerequisites

None

Required Texts

Cutnell & Johnson: 7th edition. Wiley, 2007.

Eisenkraft. Quanta. 2006.

Eisenkraft, Active Physics: Third Edition, 2009

Grading Policies

Grades will be determined by a combination of weekly assignments, participation, tests and the final project.

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| ● Class discussion/attendance/participation | 20 points |
| ● Homeworks | 20 points |
| ● Just-in-time survey questions | 10 points |
| ● Tests (3) | 30 points |
| ● Final Project/Exam | 20 points |

***** See Spreadsheet "Topic Outline" on course Moodle for week-by-week topic outline.**