Physics of Audio and Video

PHYS-1330
PHYS-3330
Topics Include:

- Waves
- Acoustics
- Speakers
- Magnetism
- CD, DVD
- Video and HDTV
- Satellite Communications
- Lasers
- Antennas
- Musical Instruments
- Fiber Optic Communication
- Radio Broadcasting

Fulfills a Gen. Ed. Requirement
SYLLABUS
PHYSICS OF AUDIO AND VIDEO,
DIGITAL AUDIO AND VIDEO
Lectures: M, W, F 10:45 a.m. – 11:35 a.m., JFB 101

INSTRUCTOR:
Orest G. Symko
316 J. Fletcher Building (JFB), Tel. (801)581-6132, Fax: 581-4801, e-mail: orest@physics.utah.edu
Office Hours: 8:30 to 9:30 a.m., Monday, Wednesday, or by appointment
Secretary: Nancy Kurtzeborn, 201-A JFB, Tel.: (801)585-1754.

AIM:
This is an introduction to the principles of physics as applied to audio and video systems and their performance. The goal is to bring out the relevance of physics, which is used in sound and video recording and reproduction in analog and digital forms, including the latest technologies. The course has also lab experiments to provide hands-on experience in this popular but important field. The topics covered address the question of “how does it work” and “why” in acoustics and video reproduction and recording.

TEXT:
Physics of Hi-Fi: Analog to Digital, O.G. Symko, Kendall/Hunt Publishing Co., and Notes

TESTS:
1. February 9, 2018
2. March 9, 2018
3. April 13, 2018
4. FINAL: Friday April 27, 2018, 10:30 a.m. – 12:30 p.m.

Absolutely NO make-up tests!

GRADING:
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INFORMATION:
Last day to drop (delete) class: January 19
Martin Luther King Holiday: January 15
Last day to withdraw from class: March 9
President’s Day Holiday: February 19
Spring Break: March 18 – 25
Classes End: April 24
Final Exam Period: April 26 – May 2

LABS:
I. Analyzing Complex Waves
II. Speaker Characteristics, Frequency Response
III. Radio Broadcasting

IV. Magnetic Recording, Digital Recording
V. Other Technologies
TOPICS

1. Introduction to Audio and Video:
   Components, surround sound, home theater, 7.1 system and speaker arrangement, sources of sound, analog, digital.

2. Waves and Sound:
   Properties of waves (frequency, wavelength, speed), examples. Reverberation, Room and hall acoustics, resonance, interference, standing waves, complex Waves and musical sounds, Fourier analysis, number systems, decibels (dB).

3. Loudspeakers:
   Speaker action, near field, far field, infinite baffle, bass reflex, acoustic suspension, horns, speaker specs, efficiency, speaker sound dispersion, equalizers, home theater speakers, computer sound systems, headphones.

4. Electricity & Electromagnetism:

5. Magnetic recording & Playback:
   Fundamentals of magnetism, saturation, recording and playback heads, dynamic range, limitations.

6. Digital Recording & Playback:
   Digital process, sampling, dynamic range, laser, CD, DVD, error correction, recordable discs, compression, density of information, Blu-ray DVD.

7. Computers:
   Hard Disks, recording and playback heads, density of information, speed, flash drive, MPEG.

8. Fiber Optics:
   Technology, basics, modes, losses, types of fibers, lasers, LED, amplifiers, From Global Network to Businesses and Home, density of information, information entropy, bandwidth.

9. Wireless:
   Electromagnetic waves, broadcasting, TV, radios, cell phones, WiFi, Bluetooth, computers, Wireless Internet.