EHS 253 Physical Agents in the Work Environment

Winter 2016

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Lecture: Mondays 8a-10a; CHS 71-257

Laboratory: Specific Mondays 10a – 12 noon CHS 56-059; Presentations in CHS 71-257. When there are no labs, lectures are continued through 12 noon

The general objective of this course is to introduce students to the health hazards and control of physical agents in the workplace. This will be done primarily through lectures on the physiology of target organs, physics principles, measurement methods, health effects, and control methods of noise, radiation (ionizing and non-ionizing), and thermal stress in the work environment.

Students will also receive laboratory based instruction and demonstration of principles covered in the lecture. Additionally, presentation of a peer-reviewed article on a topic relevant to the course material will occur.

The specific objectives for the lectures are:

1. Understand the basic physics of sound and sound propagation
2. Understand the principles behind the measurement of sound, including octave band analysis.
3. Understand the current occupational exposure limits for noise exposure.
4. Understand auditory physiology and the health effects associated with exposure to noise.
5. Identify and recommend appropriate noise control methods.
6. Understand the principles, health effects, measurement and control of thermal stress.
7. Understand the basic physics of ionizing and non-ionizing radiation.
8. Understand the current occupational exposure limits for exposure to ionizing and non-ionizing radiation.
9. Recognize the limitations to current knowledge of health effects associated with exposure to low energy non-ionizing radiation.
10. Understand the health effects associated with exposure to ionizing and high-energy non-ionizing radiation.
11. Understand the principles behind the control of occupational exposure to radiation.

The specific objective for the laboratory exercises are:

1. Investigate and measure the propagation of sound.
2. Investigate and evaluate different methods of noise control.
3. Use, calibrate and understand limitations of instruments used to measure sound.

4. Investigate and measure thermal environment using a variety of instruments.

5. Introduction to instruments used to evaluate exposure to radiation.

6. Select, read, analyze, present and lead discussion on a peer-reviewed journal article related to a physical agent in the workplace.

The Environmental Health competences involved are: C1,C2,C3,C4,C5,C7

Textbook: There is no required text for this course. The instructor will provide reading materials as needed. Recommended books include:


ACGIH. 2015 TLVs and BEIs, ACGIH, Cincinnati OH 2015. pp115-228

Grading: Student understanding and mastery of the presented material will be assessed by performance on homework and exams. Students will also submit laboratory reports for evaluation and orally present a journal article.

The course grade will be determined as follows:

- Homework: 25%
- Lab Work/Presentations: 25%
- Final exam: 50%

Date Lecture/Date Laboratory

01/04 Introduction: Noise – Physics of Sound and Measurement. No laboratory.

01/11 Vibration; Whole body and hand arm. No laboratory.

01/18 No lecture or laboratory. Martin Luther King Day holiday

01/25 Noise – Physiology and Noise-Induced Hearing Loss. Lab: Sound Measuring instruments

02/01 Noise – Control, Vibration and Ultrasound. Presentations on noise. Lab: Octave band analysis and dosimetry.

02/08 Ionizing Radiation Part I. Lab: Geiger counting
02/15 President's Day holiday. No lecture or lab.
02/22 Non-ionizing Radiation: Visible, IR, UV, Microwave, EMF, Laser. Ionizing radiation presentations.
02/29 Thermal Stress. Laboratory on heat stress. Non-ionizing radiation presentations.
03/07 Thermal stress continued., Thermal stress presentations
03/14 Room TBA Final Examination (3 hours; Bring your calculator!)