PHYSICAL HAZARDS

EHS 658

Fall 2012

1 Credit

Instructor

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Course Syllabus

EHS 658: Physical Hazards
Fall Term, 2012; 1 credit hour
Th 3:30PM - 5:30PM
1138 SPH2

Instructor: Rick Neitzel
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phone: 734-763-2870
email: rneitzel@umich.edu
Office hours by appointment

1. **Course Description**

This course covers a range of physical agents (with a special emphasis on noise), and discusses methods for characterizing exposures to these agents, effects of these agents on human health, and the regulations and standards which set limits for exposure to these agents. The basics of measurements and control for these agents are also introduced through hands-on exercises. At the conclusion of this course students will have gained a breadth of knowledge related to the sources, exposures, and health effects of these agents, which will allow them to better understand the public health implications of exposures to these agents. The material presented in class, and the understanding gained through completion of hands-on exercises and a laboratory report, will provide a broad perspective of the importance of physical agents in both workplace and community settings. Students will develop effective written skills in presenting and discussing their scientific findings.

*Prerequisites*: Graduate Standing or permission of instructor

2. **Course Format**

This course will focus on lectures and equipment demonstrations. Lively discussion is encouraged (and expected)

3. **Learning Objectives**

In this course, we will explore various aspects of exposure to physical hazards. Throughout the course we will emphasize the application of critical thinking skills to different scientific concepts.

<table>
<thead>
<tr>
<th>Learning objective #</th>
<th>Learning objective</th>
<th>Level of knowledge Expected</th>
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<tbody>
<tr>
<td>L1</td>
<td>Introduction to workplace and community physical hazards</td>
<td>Intermediate</td>
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<tr>
<td>L2</td>
<td>Familiarization with characteristics of the following specific physical agents: noise, human vibration (including whole-body and hand-arm), heat and cold stress, lasers and other non-ionizing radiation spanning the electro-magnetic spectrum from ultraviolet to radio frequency</td>
<td>Intermediate</td>
</tr>
<tr>
<td>L3</td>
<td>Familiarization with instruments available to measure noise, vibration, and some electromagnetic frequencies</td>
<td>Intermediate</td>
</tr>
<tr>
<td>L4</td>
<td>Discussion of health effects, source and exposure measurement methods, controls, and regulations and standards governing exposures to each of these specific physical agents</td>
<td>Intermediate</td>
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4. **Student Competencies**

<table>
<thead>
<tr>
<th>Competency #</th>
<th>Competency</th>
<th>Level of competency expected</th>
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The students that have taken this class are expected to be able to:

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<tbody>
<tr>
<td>C1</td>
<td>Assess the nature and extent of potential health hazards associated with exposure to physical hazards</td>
</tr>
<tr>
<td>C2</td>
<td>Identify sources of such physical hazards encountered in the workplace</td>
</tr>
<tr>
<td>C3</td>
<td>Select the proper method/instrument for measuring source characteristics and worker and community exposure levels</td>
</tr>
<tr>
<td>C4</td>
<td>Interpret such measurements with respect to current regulatory standards</td>
</tr>
<tr>
<td>C5</td>
<td>Make informed recommendations for control options to reduce exposures/hazards</td>
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5. **Ctools**

A Ctools site is maintained for this course and can be accessed via the gateway site at [https://ctools.umich.edu/portal](https://ctools.umich.edu/portal).

The schedule for the course is maintained on the Ctools site, with supplemental readings, lecture slides and handouts linked as Resources. Announcements of changes or additions to the course schedule, readings and assignments will be made in class and posted to the Ctools site.

6. **Readings**

Readings will be drawn from the peer-reviewed primary literature and available on Ctools. It is essential to review the pages recommended on the syllabus before coming to class.

7. **Performance Evaluation**

This class is taught at a graduate level, and regular attendance and participation in classroom discussion is required. Grading is based on:

- **Attendance** (20%)
- **Participation** (20%)
- **One lab report** (20%)
- **Two take-home quizzes** (20% each).

8. **Classroom Courtesy and Special Precautions for Flu Season**

Please turn off cell phones and texting devices during class and limit laptop use to course note taking. Be on time for class and return to the classroom on time after break. Finally, should you become ill, especially with flu-like symptoms, please stay at home. Contact the course instructor for information on how to catch up with course materials following your illness.

9. **Academic Integrity**

The following is the School of Public Health statement on academic integrity (Standard of Academic Conduct, University of Michigan School of Public Health, June 2004):

“The faculty of the School of Public Health believes that the conduct of a student registered or taking courses in the School should be consistent with that of a professional person. Courtesy, honesty, and respect should be shown by students toward faculty members, guest lecturers, administrative support staff, and fellow students. Similarly, students should expect faculty to treat them fairly, showing respect for their ideas and opinions, and striving to help them achieve maximum benefits from their experience in the School.

Student academic misconduct refers to behavior that may include plagiarism, cheating, fabrication, falsification of records or official documents, intentional misuse of equipment or materials (including library materials), and aiding and abetting the perpetration of such acts. The preparation of reports, papers, and examinations, assigned on an individual basis, must represent each student’s own effort. Reference sources should be indicated clearly. The use
of assistance from other students or aids of any kind during a written examination, except when the use of aids such as electronic devices, books, or notes has been approved by an instructor, is a violation of the standard of academic conduct.”

The standards of academic conduct and procedures for dealing with alleged violations of these standards are detailed online at the following URL: http://www.sph.umich.edu/students/handbook/rights.html

Allegations of violation of this honor code and standard of academic integrity will be handled according to SPH procedures as detailed in the web site, http://www.sph.umich.edu/students/handbook/rights.html

10. Class Schedule

<table>
<thead>
<tr>
<th>Session/ Date</th>
<th>Topic</th>
<th>Readings</th>
<th>Assignment</th>
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</table>
| 6 Sept | Noise, part I  
• Introduction  
• Fundamentals of sound  
Passchier-Vermeer and Passchier 2000 | -- |
| 20 Sept | Noise, part II  
• Noise-induced hearing loss  
• Non-auditory health effects  
• Instrumentation  
• Measurement  
| 4 Oct | Noise, part III  
• Hearing conservation programs  
• Sound propagation  
• Directivity  
• Reverberation/absorption  
| 18 Oct | Noise laboratory exercise (Note: the Warren Cook IH Discussion also occurs on this day, and attendance is highly encouraged) | | -- |
| 1 Nov | Noise, part IV and human vibration  
• Hearing protection devices  
• Hand-arm vibration  
Chapter 6: Hearing Protection Devices, NIOSH Criteria Document 98-126  
Pelmear and Leong, 2000  
Smith and Leggat, 2005 | Lab report due |
| 14 Nov | Thermal stress  
• Common thermal stress environments  
• Physiology and thermoregulation  
• Standards and guidelines  
• Exposure control  
| 29 Nov | Non-ionizing radiation  
• Background / Principles  
• Static (DC) Fields  
• Extremely Low (& Very Low) Frequency  
• Radio Frequency and Microwave Radiation  