Division of Environmental and Occupational Hygiene
Course Objectives and Outcomes Form

Course number and title: 26-OSE-748  Introduction to Measurement Techniques in Ergonomics
Graduate Credits: 3
Instructor(s) in-charge: Kermit Davis
Course type (underline all that apply): Lecture Laboratory Field Projects
Required or Elective: Required

Course Schedule:
- Lecture: __3__ hours per week __20__ meetings
- Discussion: __0__ hours per week __0__ sessions
- Field Work __0__ hours per week __0__ hours per survey/project
- Outside Study: __10__ hours per week
- Office Hours: __Available when needed__

Course Assignments:
- Homework: __8__ assignments
- Exams: __0__ midterms / finals
- Reports: __1__ required
- Project __0__ required

Grading Policy: Grades are based on completion weekly evaluation reports (40%), participation in the labs (5%), written final summary report (30%), and final presentation (25%)

Course Prerequisites: None

Catalog Description: Provide students with an understanding and working knowledge of how to evaluate and control the risk of musculoskeletal disorders of the low back and upper extremity in the design of industrial workplaces. Risk & exposure assessment techniques will be discussed.

Textbook and Any Related Course Materials: Relevant articles are provided to the students on each of the topics. These range from peer-reviewed journal articles (when available) to instruction manuals to web sites where forms are located.

Blackboard: All assignments, articles, and worksheets are displayed and updated throughout the quarter.

Topics Covered / Duration:
- NIOSH 1991 Lifting Equation and 1981 Lifting Guide (1 1-hr class, 2-hr lab)
- LMM Risk Model (1 1-hr class, 2-hr lab)
- 2D Static Strength Model (1 1-hr class, 2-hr lab)
- Psychophysics Lifting Tables (1 1-hr class, 2-hr lab)
- Rapid Entire Body Assessment/ Rapid Upper Limb Assessment (1 1-hr class, 2-hr lab)
- Strain Index/ Quick Exposure Checklist (1 1-hr class, 2-hr lab)
- PLIBEL (1 1-hr class, 2-hr lab)

Course goals/objectives:
1. Understand the strengths and weaknesses of the ergonomic tools with respect to usability, effectiveness, and resource requirements through practical application of the tools.
2. Utilize the tools under realistic situations to assess the risk of musculoskeletal injuries.
3. Understand the utility of the ergonomic tools with respect to various workplace environments.

Evaluation Criteria:
1. Weekly output data sheets showing analyses were completed for each of the ergonomic tools.
2. Written report comparing the evaluation tools to each other with respect to the laboratory simulated tasks as well as video analyses of actual jobs.
3. Presentation of the results to the class about the benefits and limitations of each of the tools. This presentation is done in a group discussion.
**Relation to Program Educational Objectives:** This is a required course for all Comprehensive Practice majors. The course contributes to the following Program Educational Objectives, as shown:

<table>
<thead>
<tr>
<th>Objective</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fundamental Knowledge</td>
<td>35%</td>
</tr>
<tr>
<td>Hygiene Science</td>
<td>5%</td>
</tr>
<tr>
<td>Basic Science</td>
<td>30%</td>
</tr>
<tr>
<td>Design Skills</td>
<td>10%</td>
</tr>
<tr>
<td>Professional Skills</td>
<td>10%</td>
</tr>
<tr>
<td>Life-long Learning</td>
<td>10%</td>
</tr>
</tbody>
</table>

NOTE: EOH faculty define Hygiene Science as all the Knowledge Elements in our list other than the Basic Sciences; Design skills are the technical skills in our list, while the Professional skills are those that involve teams, management, leadership, written and oral communication, approach to stakeholders and ethics—refer to listing in What We Teach).

Is there a TA? Yes
Is computer use expected? Yes

**Program outcomes and how they are covered in this course**

For each ABET IH Program Outcome (A through L), the EOH Educational Outcomes are shown below. Upon completion of this course, students will have had the opportunity to acquire knowledge (K), skills (S) and attitudes (A) associated with each of the Educational Outcomes, as noted by underlining. Where the educational measurable outcome contributes strongly to the ABET Program Outcome, the K/S/A is shown in upper case; where the contribution is average, the k/s/a is shown in lower case letters. (Note, use the Contribution to Knowledge and Professional Skills estimates above to guide your decision. If the % is 50 or more, use upper case.)

**A. Identify agents, factors and stressors generated by and/or associated with defined sources, unit operations and/or processes:**

- Identify potential health hazards of workplace processes and operations
  
<table>
<thead>
<tr>
<th>K</th>
<th>S</th>
<th>A</th>
<th>k</th>
<th>s</th>
<th>a</th>
</tr>
</thead>
</table>

**B. Describe qualitative and quantitative aspects of generation of agents, factors and stressors:**

- Understand and describe the underlying processes of the generation of hazards in occupational settings
  
<table>
<thead>
<tr>
<th>K</th>
<th>S</th>
<th>A</th>
<th>k</th>
<th>s</th>
<th>a</th>
</tr>
</thead>
</table>

- Describe qualitative and quantitative aspects of hazards associated with specific occupational or environmental sources
  
<table>
<thead>
<tr>
<th>K</th>
<th>S</th>
<th>A</th>
<th>k</th>
<th>s</th>
<th>a</th>
</tr>
</thead>
</table>

**C. Understand physiological and/or toxicological interactions of physical, chemical, biological and ergonomic agents, factors and/or stressors with the human body:**

- Understand the relation between exposures and health outcomes
  
<table>
<thead>
<tr>
<th>K</th>
<th>S</th>
<th>A</th>
<th>k</th>
<th>s</th>
<th>a</th>
</tr>
</thead>
</table>

- Recognize the potential for differences in response to hazards due to personal factors among some subjects at risk of exposure and the subsequent need to modify programs and practices
  
<table>
<thead>
<tr>
<th>K</th>
<th>S</th>
<th>A</th>
<th>k</th>
<th>s</th>
<th>a</th>
</tr>
</thead>
</table>

**D. Assess qualitative and quantitative aspects of exposure assessment, dose-response, and risk characterization based on applicable pathways and modes of entry:**

- Understand how to evaluate potential adverse outcomes of chemical or physical exposures, based on similarity of the exposure to documented hazards
  
<table>
<thead>
<tr>
<th>K</th>
<th>S</th>
<th>A</th>
<th>k</th>
<th>s</th>
<th>a</th>
</tr>
</thead>
</table>

- Examine occupational hygiene aspects of emerging technologies
  
<table>
<thead>
<tr>
<th>K</th>
<th>S</th>
<th>A</th>
<th>k</th>
<th>s</th>
<th>a</th>
</tr>
</thead>
</table>
Understand the basic principles of exposure assessment and evaluation of engineering and non-engineering controls

Develop and implement an exposure assessment plan to evaluate potential hazards and controls that are in place

Gather, manage and analyze quantitative (e.g., measurements of exposure or system performance) and qualitative (e.g., written programs) data

E. Calculate, interpret and apply statistical and epidemiological data:

Apply epidemiologic and/or statistical concepts to the interpretation of exposure data

F. Recommend and evaluate engineering, administrative and personal protective equipment controls and/or other interventions to reduce or eliminate hazards:

Identify and recommend appropriate methods to reduce exposure (using engineering controls, personal protective equipment or administrative controls), or deficiencies in written programs and policies

Design work process/practice interventions

G. Demonstrate an understanding of applicable business and managerial practices:

Produce accurate written descriptions of occupational processes and activities, exposure assessment plans and evaluation of occupational and environmental work settings

Describe approaches to interact with higher-level decision makers in various management structures

Manage resources effectively

Display effective leadership

H. Interpret and apply applicable occupational and environmental regulations:

Understand, interpret and apply occupational and environmental regulations

Apply guidelines, standards and laws in the interpretation of quantitative and qualitative data

I. Understand fundamental aspects of safety and environmental health

Apply the professional code of ethics to a scenario

J. Attain recognized professional certification

Understand the importance of ethics in the practice of occupational and environmental hygiene

Understand the need for and resources available for continuing professional development after graduation
K. Conduct a research activity resulting in a report that demonstrates mastery of the subject and high level of professional and public communication skills

Design a research question, develop a plan and conduct research

Communicate effectively with a variety of stakeholders (e.g., labor, management, government, peers, safety and health professionals, allied professionals)

Produce a technical scientific report on research

L. Demonstrate advanced qualitative and quantitative problem-solving skills

Function effectively as part of a multidisciplinary team

COURSE MATERIAL AND AVAILABILITY

<table>
<thead>
<tr>
<th>Course Objectives/outcomes</th>
<th>Students</th>
<th>Instructor(s)</th>
<th>TA</th>
<th>Division</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lecture notes, assignments</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Samples of homework and correct answers</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Samples of reports, graded</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Samples of exams and correct answers</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Course evaluation from students</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Instructor response/actions to evaluation comments</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

NOTE: Students provide feedback on individual courses through the end-of-class Department and Division evaluation survey instrument. This instrument provides feedback on the course material, organization and presentation, and perceived contribution of the course to the achievement of Program Outcomes. In addition, feedback is received from the continuing, semi-annual Question-feedback process during which students identify Best Learning Experience, Session/presentation that was an endurance test, What would make life as a student better?, If I could do it over, I would…, Opportunities I would like to have but don't seem to be available, Opportunities I would like more of, Aspects of the program the faculty should consider eliminating, Worst part of the UC program, Best part of the UC program, Other comments. A Ph.D. and M.S. student participate in Division faculty meetings. Exit surveys are conducted by the University at graduation and results are forwarded to the Chair of the Department for follow-up. All students are urged to participate fully in each of these activities in order to improve the educational experience.