Course Description: ENV H 566/ IND E 566/ NSG 508 (Three Quarter Credits). Basic principles of ergonomics in the work environment applied the worker. Topics include musculoskeletal disorders, assessing physical exposure in the workplace, workplace and work tool design, evaluating lifting and material handling activities, applied biomechanics, and implementing ergonomic programs.

Prerequisites: Basic human anatomy and physiology or permission of instructor

Location and Time: Thursdays 9:30 – 12:20 LOW 219

Instructor: Peter Johnson, PhD; Associate Professor, Department of Environmental and Occupational Health Sciences, phone: 221-5240; e-mail: petej@uw.edu

TA: Maggie Hughes, PhD Student, Department of Environmental and Occupational Health Sciences, phone: 543-4727; e-mail: mhughes@uw.edu

Office Hours: Drop in or by appointment, 4225 Roosevelt Way NE, Room 120


Supplemental reading materials to be distributed electronically on class website

Class Website: https://canvas.uw.edu/courses/ 947082

Learning Objectives: At the end of this course, the student will be able to:
1. Identify and be familiar with the physical, individual and organizational factors which can contribute to musculoskeletal disorders.
2. Identify and be familiar with common musculoskeletal disorders which can result from occupational activities.
3. Identify and be familiar with the structure and anatomy of the upper extremities and low back
4. Use various assessment tools to identify and evaluate various upper extremity hazards in the workplace.
5. Use various assessment tools to identify and evaluate lifting and manual material handling activities.
6. Identify ergonomic hazards and implement solutions in office and manufacturing environments.
7. Use various economic techniques to identify, propose and justify implementing ergonomic solutions in the workplace.
8. Be able to set-up, establish and maintain a workplace ergonomics program

Grading: 10% Class participation, 15% Homework, 20% Midterm Exam, 25% Research Assignment, 30% Final Exam

Changes: The instructor reserves the right to make changes to the syllabus during the course. Any necessary changes will be announced in class and posted on the class website.

COURSE SCHEDULE

Week 1 – January 8, 2015
1. Introduction to Ergonomics

Assigned readings for January 15 – Book and Website:
1. Book - Chapters 1, 2 (pp 18 – 22), 4, and 8 (pp 154 - 164)
2. Chapter 10 – NRC
3. NIOSH Yellow Book Executive Summary
4. 2012 BLS Injury Data
5. 2012 BLS Lost Work Time

Homework
1. Job Opening - Create a Resume (Practitioner) or CV (Researcher) and supply a one page cover letter why you feel you are suitable for our job opening as an ergonomics consultant (Practitioner) or ergonomic researcher (Researcher) posted on the class website. Submit your cover letter and resume/CV to the class website before class January 15th.
Week 2 – January 15, 2015

1. Anthropometry Overview
2. Research Application of Anthropometry
3. Anatomy of the back

Assigned readings for January 23 – Book and Website:
1. Book - Chapters 3, 5 and 9 (pp 191 – 212)
2. NIOSH Guide to Manual Material Handling
3. ACGIH Lifting TLV
5. Russell – Lifting Tool Comparisons

Homework
1. Anthropometry Homework: Consider the things you encounter in everyday activities, identify 5 bad designs/abuses based on ergonomics and anthropometry and identify 5 good designs based on ergonomics and anthropometry. Submit your photos or examples to the class website before class. Due January 23rd at the beginning of class.
2. Design a “safety shower” using the diagram from class. Answer the questions: a. Who will use it? b. What is the function it needs to serve? Then, determine the height of the shower head and the position (height and reach) of the handle. Explain your rationale. Use only the design presented in class – do not redesign. You are free to use the anthropometric tables from class or others that you research on your own. Due January 29th at the beginning of class.

Week 3 – January 22, 2015

1. Introduction to Statics
2. Material Handling/Back Protection
3. NIOSH Lifting Equation
4. ACGIH Lifting Standard/TLV
6. 3DSSPP
7. Comparison of Lifting Tools

Assigned reading for January 29 – Book and Website
1. Book - Chapters 2 (pp 13 - 17, 22), 8 (pp 164-186), and 18 (pp 390 – 403)
2. Perceived Exertion and Pain Scales

Homework
1. Static Analysis Problem Set (example 3). Due beginning of class February 5th.
2. Solve the hopper lifting problem in the NIOSH Guide to Manual Materials Handling using both the NIOSH lifting equation and the ACGIH Lifting TLV (due beginning of class January 29th)
3. Targeted Research Assignment. Choose one of the following topics (or propose your own topic) and write a maximum 10 page paper double spaced providing an introduction and the state of the art knowledge in your proposed topical area. The content should be based on a minimum of five sources (peer reviewed journal articles preferred). Students will present a 12 minute PowerPoint presentation to the class. Topic must be presented and approved by instructors by January 29th, presentations will be given in class March 5th or 12th and the paper is due at the beginning of class March 12th.

Potential Topics: ergonomics and productivity, ergonomic standards, lean manufacturing and ergonomics, ergonomics and the fishing industry, hand tool design, construction ergonomics, office ergonomics, manufacturing ergonomics, manual material handling, patient handling, whole body vibration, hand-arm vibration, agricultural ergonomics, instrumentation, electromyography, goniometry, inclinometry

Week 4 – January 29, 2015

1. Upper extremity anatomy
2. Upper Extremity Musculoskeletal Disorders
3. Objective and Subjective Measurements Methods
4. Examples of Ergonomic Assessments

Assigned reading for February 5 – Book and Website:
1. Book - Chapters 14 and 15
Week 5 – February 5, 2015
1. Midterm
2. Statics and Lifting Analysis Homework Review
3. Hand arm and Whole Body Vibration

Assigned reading for February 12 – Book and Website:
1. Book - Chapters 18 (pp 403 – 405) and 19

Week 6 – February 12, 2015
1. Midterm - review
2. Manufacturing Ergonomics and Hand Tool Use and Design

Assigned reading for February 19 – Book and Website:
1. Book - Chapters 10
2. ACGIH HAL TLV
3. Moore Article - Strain Index
4. Appendix B from the Washington State Standard
5. MacAtamney – RULA
6. Buchholz, PATH

Homework
Internet Assignment – Find 10 ergonomic-related websites and submit the top three websites (due beginning of class February 19th)

Week 7 – February 19, 2015
1. Summary of ergo resource sites
2. ACGIH HAL TLV, Strain Index, RULA, PATH
3. Office Ergonomics

Assigned reading for February 26 – Book and Website:
1. Book – Chapter 13 and 17
2. Gerr Article – Incidence of WMSDs among computer workers
3. Office Ergonomics Materials
4. Goggins Article – Ergonomics and Return on Investment

Homework
Upper Extremity Case Study - Use the ACGIH HAL TLV, the Strain Index and the RULA to evaluate the video posted on the website. Write a three to five page summary of your findings comparing and contrasting the tools (due beginning of class February 26th).

Week 8 – February 26, 2015
1. Construction Ergonomics
2. Justifying costs of ergonomic solutions
3. Ergonomic process/program development and implementation

Homework
Justifying the cost of an ergonomic intervention (due beginning of class March 6th)

Week 9 – March 6, 2015
1. Student targeted reading presentations

Week 10 – March 13, 2015
1. Student targeted reading presentations

Final Exam: To be announced