

# **Evidence Based Practice: Applying research to ergonomic challenges in the workplace.**

## **Course Syllabus (Fall 2018)**

### **Course Description**

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This 8-week, asynchronous online course is designed to prepare the student to be a competent consumer of research by applying a thorough critique of various papers and applying conclusions from published research into ergonomic practice. Students will read various research articles and identify the study objectives, aims and hypotheses as well as critique the study methods for appropriate study design, generalizability, sources of bias and threats to validity. Students will learn about observational studies (cross-sectional, prospective, retrospective and case-control) and intervention studies (parallel and multi-factorial randomized control trials, cross over studies). Approaches to statistical analysis for parametric and non-parametric data and interpretation of effect estimates from analyses using ANOVAs, correlation, and logistic/linear regression will be presented. Students will develop a simple study with an objective, aims and testable hypotheses based on a question of interest based on a need at a current or future worksite/place.

### **Course Learning Outcomes**

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- Describe the process involved in asking relevant, researchable questions.
- Understand the difference between independent and dependent variables and be able to identify them in various studies of interest.
- Understand how subject population in a study extends to the generalizability of results as well as potential sources of bias.
- Based on the stated objectives, complete a critical critique of a study including the subject population, study design, independent and dependent variables including measurement methods and timepoints chosen.
- Identify sources of error and whether they contribute to random or systematic bias.
- Analyze a statistical plan for appropriateness and evaluate the interpretation of results.
- Given a study design and statistical analysis plan, select the appropriate statistics (both parametric and non-parametric) to describe the data, compare the data, or make predictions using the data.
- Interpret the results of statistical analysis including regression analysis (linear and step-wise), evidence-based medicine statistics (risk ratios, predictive values, number needed to treat), descriptive statistics (chi square, frequencies, proportions), and comparison statistics (ANOVA, comparisons of medians/means).
- Based on existing evidence and/or workplace experience, create an ergonomic-related research question with specific aims, hypotheses and appropriate study design.
- Succinctly develop a plan to carry out a simple research study that one might do as part of a project in the workplace, including a review of the current literature; a justification of need; study purpose, aims and hypotheses; data collection methods that control for confounding while increasing validity and reliability; resource needs to perform the study.
- Evaluate the rigor of qualitative research studies.
- Demonstrate a fundamental knowledge of the science of human factors and ergonomics and ethical responsibility in practice, specifically when designing a workplace study.

## Instructor Information

<p><b>Instructor Name</b></p> <p><b>Dr. Carisa Harris, PhD, CPE, PT</b></p> <p><b>carisaharris@berkeley.edu</b></p>	
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Carisa Harris, PhD, PT, CPE is an Assistant Professor in the Department of Medicine at the University of California at San Francisco, and in the School of Public Health at the University of California at Berkeley. She is also the Director of the UCSF/UCB Ergonomics Research & Graduate Training Program and the Deputy Director of the Northern California Center of Occupational & Environmental Health (COEH). She received her PhD in Environmental Health Sciences at the University of California, Berkeley and teaches a variety of classes including Occupational Biomechanics and Industrial Engineering Human Factors Design. Dr. Harris and her team performs research in a variety of areas focused on understanding and preventing work related injuries and improving human performance, productivity and health. Her epidemiological research assesses and adjusts for healthy worker survivor bias in the assessment of physical, personal and work psychosocial factors associated with Carpal Tunnel Syndrome and subsequent work disability. Additionally, her team is developing a variety of exposure assessment devices (wearables) for primary and secondary prevention purposes and performs various intervention studies on occupational tasks with high risk of musculoskeletal injuries. The lab has a history of performing research in the construction, computer, medical, hotel and manufacturing sectors. From a global health perspective, Dr. Harris collaborates on research assessing the impact of heavy load carrying among women in developing countries (Nepal, Tanzania, Ethiopia) on associated morbidity.

## Course Format & Schedule

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This asynchronous online course engages students with weekly activities posted on the course site. Each week students will read and/or watch resource materials, participate in online discussion forums and complete individual and paired assignments. There are no required textbooks, but some reference books are recommended and sections of texts are provided and assigned for reading. The information needed to complete the assignments and prepare for the online midterm and final exams will be included in the resource material on the course site. Grades are determined by participation in assignments and discussions and performance on midterm and final exams.

### Week 1

<b>Topics</b>	<b>Assignment</b>
<b>Course Introduction- Why research is important in practice.</b>	Understanding Research Methods pp. 1-31
<b>Demystifying research- the nuts and bolts of a research paper.</b>	Understanding Research Methods pp. 69-86

<b>Objectives, aims, hypotheses- why bother?</b>	
<b>Organizing literature</b>	Introduction to Mendeley

**Week 2**

<b>Topics</b>	<b>Assignment</b>
<b>An introduction to observational studies</b>	Understanding Research Methods pp. 1-31
<b>Cross-Sectional Studies</b>	Morten Villumsen, Afshin Samani, Marie Birk Jørgensen, Nidhi Gupta, Pascal Madeleine & Andreas Holtermann (2015) Are forward bending of the trunk and low back pain associated among Danish blue-collar workers? A cross-sectional field study based on objective measures, Ergonomics, 58:2, 246-258, DOI: 10.1080/00140139.2014.969783
<b>Prospective &amp; Retrospective Studies</b>	Biomechanical risk factors for carpal tunnel syndrome. A prospective study of 2474 workers. (Harris et al, 2015) <b>*ARTICLE CRITIQUE DUE</b>

**Week 3**

<b>Topics</b>	<b>Assignment</b>
<b>All about Case – Control Studies</b>	Heecheon You , Zachary Simmons , Andris Freivalds , Milind J Kothari , Sanjiv H Naidu & Ronda Young (2004) The development of risk assessment models for carpal tunnel syndrome: a case-referent study, Ergonomics, 47:6, 688-709, DOI: 10.1080/0014013042000193291 <b>*ARTICLE CRITIQUE DUE</b>
<b>Interpreting effect estimates used in observational studies.</b>	

**Week 4**

<b>Topics</b>	<b>Assignment</b>
<b>Introduction to Intervention Studies</b>	
<b>The Randomized Control Trial</b>	Evaluation of sit-stand workstations in an office setting: a randomized controlled trial. (Graves et al., 2015) <b>*ARTICLE CRITIQUE DUE</b>

**Week 5**

<b>Topics</b>	<b>Assignment</b>
	<u>Midterm Exam</u>
<b>Within Subject Study Designs</b>	Effect of Computer Keyboard Slope on Wrist Position and Forearm Electromyography of Typists Without Musculoskeletal Disorders. (Simoneau et al., 2003) <b>*ARTICLE CRITIQUE DUE</b>
<b>Multi-Factorial Study Designs</b>	

**Week 6**

<b>Topics</b>	<b>Assignment</b>
<b>Sampling &amp; Sources of Bias</b>	Understanding Research Methods pp. 87-158
<b>Types of Validity</b>	Bias and imprecision in posture percentile variables estimated from short exposure samples. (Mathiassen et al., 2012)
<b>Reliably understanding Reliability</b>	Inter-rater Reliability of Posture Observations. (Bao et al., 2009)

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### Week 7

Topics	Assignment
Systematic Reviews	Occupational musculoskeletal and mental health: Significance of rationalization and opportunities to create sustainable production systems: A systematic review. (Westgaard et al., 2011). *ARTICLE CRITIQUE DUE
The Meta-Analysis	
Ethics in Published & Unpublished Research	Understanding Research Methods pp. 32-38

### Week 8

Topic	Assignment
No New Material	<u>Final Exam</u>

## Course Grading

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Grades are based on the following:

- 10% Discussion Participation
- 30% Weekly Article Critiques (weeks 2-7)
- 30% Workplace study proposal
- 10% Midterm
- 20% Final Exam

## Required Course Materials

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**Microphone/headset for your computer**

**Recommended Books:**

Understanding Research Methods: An Overview of the essentials by Midred L Patten (10<sup>th</sup> edition)  
<https://ebookbros.com/product/understanding-research-methods-an-overview-of-the-essentials-10th-edition-by-mildred-l-patten-ebook-pdf/> ISBN-10: 0415790530

Videos and other resources are found on weekly course pages. A weekly course guide including video transcripts and course readings will also be available on the course site for you to download. You will be provided with links to PDF files of articles and other reference materials.

## Completion of Course Modules

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Students are expected to complete all modules, including viewing all videos and lectures; completing all required readings and individual activities; and fully participating in class discussions and group activities.

## Participation in Course Activities and Discussions

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Students are expected to engage with the asynchronous course **material** on a weekly basis and complete the activities, quizzes and assignments as outlined in the course schedule. Completion of activities is mandatory; participation will contribute to the final course grade.

Students' contributions to some **assignments** are collected in a cloud-shared worksheet of data that other students in this course will access for subsequent activities.

**Midterm** serves as a knowledge check of the first four weeks of material. It will be completed online and performance contributes to the final course grade. Midterm will include multiple-choice, true/false and short answer questions.

**Discussion forums:** Students are expected to participate in weekly online discussion forums; they serve as knowledge checks in lieu of quizzes and live classroom conversation. Participation contributes to the final course grade.

## Assignments

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Students will complete the following individual and paired assignments as listed in the course schedule. Assignment details and shared data collection and report submission procedures are found on the course site and will be reviewed in class discussions.

1. **Article Critiques (6):** Using the critique worksheet provided, students will read an article and fully critique it. Critiques must be typed out and submitted online prior to class. (Individual)
2. **Weekly Discussion**
3. **Workplace study proposal (Paired):** In pairs identified during Week 1, students will determine a researchable question they want to answer as part of a workplace project. A complete description of this assignment is available in Canvas.
4. **Midterm Exam:** A short

### Assignment Requirements:

- Cloud-shared worksheet (Google Drive) contributions will be reviewed for completion and timeliness
- For written assignments:
  - Computer generated and electronically submitted via Canvas
  - Standard written English

Points will be deducted for errors in these areas. All assignments are due by 8:00pm PST on the Sunday of the week that they were assigned; unless otherwise indicated on the syllabus. Any assignment not received when due will be given an automatic 10% deduction for each day it is late. It is the student's responsibility to seek clarification regarding the requirements for any assignment if the student has questions or is unclear about those requirements. With paired assignments, both students will receive the same grade.

## Exams

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Details about the length of the exams and the materials you will be allowed to use during the exam will be posted on the course site.

## Grading Policies

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Details about the length of the exams and the materials you will be allowed to use during the exam will be posted on the course site. The policy on letter-graded courses is:

93-100% =A  
90-92.9%=A-  
88-89.9%=B+  
83-87.9%=B

80-82.9%=B-  
78-79.9%=C+  
73-77.9%=C  
70-72.9%=C-

60-69%=D  
<60%=F

## Course Communication

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As we move through the course materials, we want to hear how the course is going for you, your questions as well as how your personal and professional experiences add to our conversation. You can learn a lot from discussing the material in this course with each other and we encourage you to take advantage of the interactive components of the course to learn from each other.

### Announcements

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Announcements will be posted on the homepage of the course site. Please check regularly for updates.

### Course mail

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Course announcements will also be sent out through Canvas' notification system. The default is to receive announcements via the Course Mail system, so make sure to check your Course Mailbox for message or wherever you receive notifications.

### Office hours

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Weekly office hours are held with your instructors on Thursdays from 12:00-1:00 pm (PST); PLEASE NOTE- the first week's office hour is on TUESDAY from 12-1pm instead of the Thursday of that week. Login details for the online video conference call will be provided. If you are unable to be present, you are welcome to email your instructors through Canvas with private questions or group discussions boards.

## Policies

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### Due Dates

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Assignments and quizzes must be completed and submitted by 8:00 pm PST on the Sunday of the week they were assigned, unless otherwise indicated on the syllabus. For example, all assignments and quizzes assigned during week 1 are due by 8:00pm PST on Sunday of the first week of the course.

### Late Assignments

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Please communicate with instructors using Canvas Course Mail if you will not be able to meet course deadlines ahead of the deadlines. All individual, pair/ group activities must be completed before receiving course credit.

### Student Support Contact Information

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#### Technical Problems with Canvas

If you encounter any technical problems with Canvas such as problems opening the course site, accessing quizzes, discussions or submitting assignments or problems with mobile apps contact the Canvas 24/7 support from “Help” inside the course sites or directly using phone, chat or email:

- Canvas Support Hotline: 855-308-2758 (24/7)
- Chat: [https://secure.livechatinc.com/licence/2695732/open\\_chat.cgi?groups=38](https://secure.livechatinc.com/licence/2695732/open_chat.cgi?groups=38)
- Email: [support@instructure.com](mailto:support@instructure.com)

### **Broken Links, Missing Course Files**

If you find any broken links or missing course files on the course site, please alert your course facilitators and identify the location of the problem on the course site.

### **Netiquette**

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In an online environment it is not possible to read your body language, tone of voice, or facial expressions. Therefore, a special set of rules has emerged for online communications (e.g., course discussions) called Netiquette. Here are some basic Netiquette guidelines that should be followed in this course.

- Adhere to the same standards of behavior online that you follow in real life. Never mail or post anything you wouldn't say to your reader's face.
- Before posting to a discussion board, you should read prior messages to get a sense of the flow and language of the discussion. Keep your questions and comments relevant to the topic of the discussion.
- Don't be afraid to ask questions within the course discussion group, or to share what you know.
- If you post a different viewpoint, first acknowledge what someone else has said. If you disagree with someone, it is better to start a message by briefly restating what the other person has said in your own words. This lets the other person know that you are trying to understand him/her.
- Support the points you make with examples or evidence from lecture, readings and/or from your own professional experience.
- Email messages should be considered private and not shared with others or quoted without permission. However, whatever you post to a newsgroup or discussion board is public. You never know who might read what you posted.
- Consider that a post may be the first – and lasting - impression you make on someone: Make sure your postings contain correct information. Check your spelling.
- Do not use ALL CAPS. It gives the impression that you are shouting.
- Do not send “Me Too!” or “Thank You” etc. messages to the entire group. Send those directly to the original poster.
- Cite all quotes, references and sources and respect copyright and license agreements.