

## IND E 599B / 548 – Human Performance Modeling

### Winter Quarter 2021

<b>Class Meeting:</b>	MW 11:30am-12:50pm (3 credits)	MEB 250
<b>Instructor:</b>	Ji-Eun Kim, Ph.D.	Email: jkim@uw.edu
<b>Office Hours:</b>	MW 1:00 – 2:00 pm	AERB 141A

**Learning Objectives:** This course will cover emerging concepts and methods of human performance modeling (HPM), offering an integrated perspective on the behavioral, neural, and physiological bases of HPM at work. Students will learn about each stage of the human information processing model and its neural and physiological recordings. Students will also review recent articles to understand how HPM can be applied to diverse work settings including online learning, healthcare, and transportation systems. The material will be presented through a variety of hands-on activities including a group project, presentations, and weekly critiques. By the end of the course, students will be able to apply appropriate HPM and physiological recordings to predict human perception, cognition, and action in the workplace.

**Grading Policy:** Students will be expected to fully participate in class discussions and activities. Grades will be based on such class-participation, as well as on performance in conducting paper presentations, weekly critiques, quizzes, and final project.

Class discussions/participation	5 %
Paper presentation	15 %
Weekly critiques	20 %
Quizzes	30 %
Final project	30 %

(The final project includes: Proposal 5 %, Literature review 5 %, Design of experiment, 5 %, Presentation 5 %, Report 10 %)

**Required Text:** Readings assembled by instructor (on course website)

**Quizzes:** The quizzes will be focused on the lecture notes and readings. Quizzes will be closed-book and closed-notes. A one-page cheat sheet is allowed.

**Weekly Readings and Critiques:** Students are expected to read the material before class. There is a weekly assignment that includes a write-up of the journal article that was assigned for discussion that week; You will submit a one-page critique for one of the assigned papers. The critiques are worth 5 pts each. Do not merely copy the abstract, introduction or conclusion of the papers, you need to add value and insight beyond what is in the paper. A good critique:

- Describes the research problem being addressed and existing approaches (in your own words) (1 pt)
- Explains the general approach the authors used to address the problem (1 pt)
- Critically analyzes and questions the data, results and methods used (1 pt)
- Discusses supplemental or follow-up research that might be pursued in the future (1pt)

**Final Project:** The purpose of the final project is to put the neural and physiological bases of human performance modeling techniques into practice. The final project is a group project involving teams of 2-3 members, depending on the class size. The deliverables include a project proposal, a literature review, the design of experiments, a presentation, and a project report. All deliverables should indicate the contribution of each member. At the end of the course, a peer evaluation of all team members will be conducted. The shared project grade among group members will be adjusted for individual members according to the instructor's evaluation of each member's contribution and the peer evaluation results (e.g., 4-5 points for 100%, 3 points for 90%, 2 points 80%, 0-1 point for 50%).

**Prerequisite:** An introductory course in Human Factors at the undergraduate level.

**CANVAS:** All information pertaining to this course can be found in Canvas. All lecture notes and assignments will be posted on the course's Canvas page. Students are responsible for visiting the course page frequently for any announcements and updates.

**Course Policy on Academic Misconduct:** Engineering is a profession demanding a high level of personal honesty, integrity and responsibility. Therefore, it is essential that engineering students, in fulfillment of their academic requirements and in preparation to enter the engineering profession, shall adhere to the University of Washington's Student Code of Conduct (<https://www.washington.edu/cssc/for-students/student-code-of-conduct/>). Any student in this course suspected of academic misconduct (e.g., cheating, plagiarism, or falsification) will be reported to the College of Engineering Dean's Office and the University's Office of Community Standards and Student conduct. (See CoE website for more detailed explanation of the academic misconduct adjudication process: <https://www.engr.washington.edu/mycoe/academic/integrity>). Any student found to have committed academic misconduct may receive a grade of 0 on impacted academic work (e.g., assignments, project, or exams).

**Access and Accommodations:** Your experience in this class is important to me. It is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law. If you have already established accommodations with Disability Resources for Students (DRS), please activate your accommodations via myDRS so we can discuss how they will be implemented in this course. If you have not yet established services through DRS, but have a temporary health condition or permanent disability that requires accommodations (conditions include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), contact DRS directly to set up an Access Plan. DRS facilitates the interactive process that establishes reasonable accommodations. Contact DRS at [disability.uw.edu](mailto:disability.uw.edu).

**Religious Accommodation Policy:** Washington state law requires that UW develop a policy for accommodation of student absences or significant hardship due to reasons of faith or conscience, or for organized religious activities. The UW's policy, including more information about how to request an accommodation, is available at [Religious Accommodations Policy \(https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/\)](https://registrar.washington.edu/staffandfaculty/religious-accommodations-policy/). Accommodations must be requested within the first two weeks of this course using the [Religious Accommodations Request form \(https://registrar.washington.edu/students/religious-accommodations-request/\)](https://registrar.washington.edu/students/religious-accommodations-request/).

**Tentative Course Outline** (Any necessary changes will be announced in class and posted on the website. Critiques are due at 11 am on the Wednesday before class. \* Journal articles to be presented by students

Week	Topic	Readings	Assignments
1	Introduction to information processing model (IPM)  Human nervous system	Chap. 1. Introduction to psychophysiology, Psychophysiology, Andreassi, J. L. (2010). <i>Psychophysiology: Human behavior and physiological response</i> .	
2	Introduction to neuroergonomics and psychophysiology	Mehta & Parasuraman, <i>Frontier in Neuro</i> , 2013  Dirican & Gokturk, <i>Procedia CS</i> , 2011	Critique #1  IRB certificate
3	IPM1-Human perception	Chaps. 4&5, Lee et al. (2017) <i>Designing for People: An Introduction to Human Factors Engineering</i>	Critique #2
4	Brain imaging & Stimulation	* Foy & Chapman, <i>Applied Ergonomics</i> , 2018  * Parasuraman & McKinley, <i>Human Factors</i> , 2014	Critique #3

5	EEG/ERP recording and modeling	* Stevens et al., <i>Human Factors</i> , 2019 * Allison & Polich, <i>BiolPsychol</i> , 2008 * Monteiro et al., <i>IEEE</i> 2019	Quiz 1
6	IPM2-Human cognition	Chap. 6, Lee et al. (2017) <i>Designing for People: An Introduction to Human Factors Engineering</i>	Critique #4 Project proposal
7	Eye movement recording and modeling	* Wu et al., <i>Human Factors</i> , 2019 * Kinney & O'Hare, <i>Human Factors</i> , 2019	Critique #5 Lit. review
8	IPM3-Macro-cognition HR/SCR recording and modeling	Chap. 7, Lee et al. (2017) <i>Designing for People: An Introduction to Human Factors Engineering</i> * Czarnek et al., <i>IJHCI</i> , 2019 * Wise et al., <i>CyberBehavSocialNet</i> , 2010	Critique #6 Design of experiment
9	Project-data collection		
10	IPM4-Response execution EMG recording and modeling	Chap. 9, Lee et al. (2017) <i>Designing for People: An Introduction to Human Factors Engineering</i> * Hwang et al., <i>Human Factors</i> , 2019 * Durso et al., <i>Human Factors</i> , 2019	Quiz2 Project report
<b>Final</b>			Project presentation