Human Factors / Ergonomics

Instructor: Jose Alcala

AD 201 – Section 001
NJIT Fall 2025

CKB – Room 303
Tuesdays & Thursdays 8:30 AM –9:50 AM

"Ergonomics is the study of human characteristics for the appropriate design of the living and working environment. Ergonomic researchers strive to learn about human characteristics (capabilities, limitations, motivations, and desires) so that this knowledge can be used to adapt a human-made environment to the people involved. This knowledge may affect complex technical systems or work tasks, equipment, and workstations, or the tools and utensils used at work, at home, or during leisure times. Hence, ergonomics is human-centered, transdisciplinary, and application-oriented." (Karl Kroeme, The National Research Council, 1983)

"Human Factors is the multidisciplinary study of how humans interact with systems, environments, and products, focusing on improving safety, performance, and overall user experience. It includes understanding the cognitive, psychological, and social factors that influence human behavior and decision-making in various contexts. Human Factors aims to design systems that are intuitive, reduce errors, and enhance the effectiveness of human-system interactions by considering how people perceive, process, and respond to information." (Human Factors in Engineering and Design, Mark S. Sanders and Ernest J. McCormick, 1957)

Course Description

Through lectures and "hands-on" experiments, this course will challenge the student to explore objects and environments as sensory and psychological experiences that effect human comfort, efficiency, function and emotion. Emphasis will be put on empathizing with the user with particular attention to those individuals with special physical, cognitive or occupational needs.

Course Objectives

- Appreciate the breadth and depth of the Human Factors discipline.
- Use human factors data and principles to evaluate problems and design solutions.
- Understand human limitations and capabilities and how they impact the design of controls, displays, and related devices.
- Appreciate how human factors can influence the design and resulting effectiveness of human-system interactions.
- Demonstrate the critical thinking skills of design from a human factors perspective.
- Understand the human musculoskeletal system and its limitations related to work.
- Be able to apply anthropometry methods to workplace, workstation and tool design.
- Formulate and analyze measurable quantitative and documentable qualitative usability specifications for user-based interaction.
- Weave together Physical, Cognitive and Emotional Ergonomics as a means to reach a wholistic understand the human activities related to work, information processing and perception.

Your Responsibility

- **Participate in class** discussions. Contribute individual experiences and opinions when relevant to the topic so that others can benefit and learn. This is a big part of the class!
- **Ask questions**…there is no dumb/bad question.
- **Respect** others opinions, and their social, cultural, political, moral and religious point of view.
- **Cell phones** shall be turned off / silenced at the beginning of class unless you are emergency personnel on-call. Use of a cell phone during class will not be tolerated unless it is an emergency call. In this case please excuse yourself from the class.
- **Headphone / ear buds** shall be removed during class time.
- Take **individual responsibility** for completing and submitting assignments on time.

- **Participate in all team-related** activities, homework assignments, presentations and exercises.
- **Check e-mail and Canvas** frequently. Everyone must have an active e-mail address. You can receive a free e-mail address and access to the Internet from NJIT.
- At the end of semester all work produced for this class shall be uploaded to a Google Drive created by the professor. **ALL work shall also be uploaded to Kepler4.** Failure to do so shall result in a failing grade until this requirement has been satisfied.
- **Regular attendance** is expected. When possible, please give advance notice of your absence. NJIT requires attendance for **ALL** students. After 3 recorded absences, your grade will be lowered by one-half () grade point for each additional absence, if you are not carrying a medical, school or religious related excuse. No excuses will be accepted without a written note from the Dean or a doctor. Students with particular needs and foreseen absences should present them to their instructor within the first week of class.
  Attendance for student athletes: No student athlete may miss any regularly scheduled classes for any practice activities. This means students can neither miss nor leave class early (or arrive late) to attend a practice. While student athletes may miss class when participating in intercollegiate competition, it is the responsibility of the student athlete to proactively inform the instructor well in advance to make appropriate arrangements to complete or make up any assignments or exams in a timely fashion.
- **Lateness** is inconsiderate and disruptive - and will not be tolerated. Five lates will lower your grade by one-half () grade point.
- **Academic Integrity** is the cornerstone of higher education and is central to the ideals of this course and the university. Cheating is strictly prohibited and devalues the degree that you are working on. As a member of the NJIT community, it is your responsibility to protect your educational investment by knowing and following the academic code of integrity policy that is found at: *NJIT Academic Integrity Code*.
  Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at *dos@njit.edu*
- **Generative AI** may be used as a tool this semester for research and / or creative brainstorming, however, it is only to be used under the permission and guidance of the professor and under specific circumstances. The student is not to use it as a means of answer generation for quizzes, exams or assignments.

Grading

Final grade will be based on the following criteria: Level of effort and commitment, quality of work, reading assignment comprehension, class participation, project progress, timely submissions, and subject comprehension as demonstrated by quizzes, exams and attendance.

Grade distribution:

- Participation in Class - includes in-class discussions and regular attendance: 20%
- Assignments/Projects: 30%
- Quizzes: 30%
- Final Project: 20%

Required Reading

- There will be reading assignments consisting of excerpts from books, periodicals, journals, and on-line articles available for you to review on the Kepler site for this course. In the interest of keeping paper consumption down to a minimum, it is recommended that you not print the documents.

You are expected to come prepared to engage in round table discussions and debates of the reading material in the following week.

Suggested Reading

- Norman, D. A. *The Design Of Everyday Things*, *revised and expanded edition*
- Tilley, A. R. & Henry Dreyfuss Associates. *The Measure Of Man And Woman: Human Factors In Design, revised edition*
- Salvendy, G. (Ed.), *Handbook Of Human Factors And Ergonomics*
- Sanders & McCormick, *Human Factors in Engineering and Design*
- Macleod, Dan, *The Rules of Work – A Practical Guide to Ergonomics*
- Stephen Pheasant, *Bodyspace*
- John D Lee (Author), Christopher D. Wickens (Author), Yili Liu (Author), Linda Ng Boyle (Author) *Designing for People: An Introduction to Human Factors Engineering 3rd Edition*
- Kelly S. Hale (Editor), Kay M. Stanney (Editor) *Handbook of Virtual Environments: Design, Implementation, and Applications*, *Second Edition*
- Kim Vicente, *The Human Factor*
- Wilson & Corlett, *Evaluation of Human Work*
- Wickens and Hollands, *Engineering Psychology and Human Performance*

Weekly Course Schedule

The weekly course schedule along with reading assignments and project assignments will be available on Canvas. Schedule and assignments are subject to change so please be sure to check frequently for updates.

Contact Information

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Office Hours: Mondays and Wednesdays 10:00 AM – 11:00 AM. Please make an appointment.