Cornell University

DEA 3510/6510 Human Factors and Inclusive Design

Semester	2023—24 Fall
Credit	3 units for both DEA 3510 and 6510
Lecture room	MVR 1102
Time	Tuesdays and Thursdays between 1:25pm and 2:40pm
Course website	Cornell Canvas

Instructor	Jay Yoon, PhD
Email	jy846@cornell.edu
Office	3427 Martha Van Rensselaer Hall

Teaching assistant	Nastaran Radmanesh, MA
Email	nr362@cornell.edu

Office hour	Friday between 09:00 and 11:00am **by appointment**

COURSE DESCRIPTION[1]

This 3-credit course provides an intermediate-level overview of the concepts and principles of human factors with a focus on design for inclusivity. The course will introduce students to how human factors can be systematically considered and implemented in the development of products[2] (e.g., the capabilities and constraints of the physical, cognitive and cultural makeup of human beings). The course incorporates specific studies of human requirements, including not only the non-disabled adult but also the aged and those who are differently abled, and consider implications for different user populations and their characteristics. Through the lectures and course activities, students will develop competencies in human factors and inclusive design for academic research and professional practice.

LEARNING OBJECTIVES

- To develop knowledge of the main concepts of human factors including user capabilities / characteristics and how they can be incorporated into designed systems
- To understand the history, concepts, and process of inclusive design
- To develop the practical skills to manage a process of designing a product incorporating the goals of both human factors and inclusive design

LEARNING OUTCOMES

On successful completion of the course, students should be able to demonstrate:

- An ability to articulate key concepts of human factors and inclusive design including human information processing, cognitive and physical human-product relationships, and design exclusivity assessment
- Evidence-based reasoning and make critical judgments about both inclusivity and human factors issues.
- Theoretical knowledge of and practical skills to initiate, design, and report an empirically-based project that addresses issues of human factors and inclusivity.
- Critical skills to improve the human factors aspects of a product and knowledge of user diversity related design challenges

COURSE DELIVERY AND LEARNING MODES

The course delivery of DEA 3510/6510 consists of a combination of several education activities, including lectures, tutorials, fieldwork, in-class project work, inter- and intra-group discussions, reflections, and project presentations. These different types of learning activities will be coordinated and adjusted based on the topic and goal of each session and the course progress (see § Course Content and Schedule).

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[1] The current version of the syllabus is subject to revision. Revisions will be announced and distributed via Cornell Canvas

[2] 'Product' represents a continuum of different design solutions that encompass multiple manifestations and scales, e.g., user interface, interior, service, product, training program, and facility planning.

DEA 6510 extends the breadth and depth of coverage of DEA 3510. DEA 6510 students take the lead of the preparation of project deliverables and study additional topic-specific literature, e.g., journal articles and book chapters. The course contents are outlined in the section of course contents and schedule.

ASSESSMENT AND GRADING SCALE

The course grade is composed by the four key elements: (1) an individual project, (2) a group project, (3) two exams, and (4) student-led seminars. The total points will be converted into a percentage and rounded off. Students will receive letter grades with pluses and minuses.

Project 1 (individual)	Project (group)	Exam 1	Exam 2	Student-led seminar	Total
30 pts	40 pts	10 pts	10 pts	10 pts	**100 pts**

COURSE CONTENT AND SCHEDULE

#		Topic	Bibliography
1	Tue, Aug 22	Course overview	
2	Thu, Aug 24	Setting house rules Setting the stage: Human factors and inclusive design in the context of value-sensitive design	[1, 2]
3	Tue, Aug 29	Introduction to human factors	[3, 4]
4	Thu, Aug 31	In-class sensitivity training (recognizing exclusion)	[5]
5	Tue, Sep 5	Introduction to inclusive design	[6-8]
6	Thu, Sep 7	Inclusive design and assistive technology	[9-11]
7	Tue, Sep 12	Design for disability and aging / context research	[12-14]
8	Thu, Sep 14	Product inclusivity evaluation 1 Submitting Exam 1 questions (scope: between #1 and #8)	[15, 16]
9	Tue, Sep 19	Introduction to the project 1 (individual)	
10	Thu, Sep 21	Exam 1 / Course reflection (scope between #1 and #8)	
11	Tue, Sep 26	Product inclusivity evaluation 2 (disability simulation)	[17]
12	Thu, Sep 28	Anthropometrics	[18]
13	Tue, Oct 3	Affordance, directionality, natural mapping, and open-endedness in design	[19-22]
14	Thu, Oct 5	Presentation of the project 1 (individual)	
15		**Fall break**	
16	Thu, Oct 12	Human errors	[23]
17	Tue, Oct 17	Attention and memory	[24-27]
18	Thu, Oct 19	Introduction to the project 2 (group) In-class discussion: Formulating the design process	
19	Tue, Oct 24	**Seminar 1**— Personas for examining digital exclusion	[28, 29]
20	Thu, Oct 26 **4:30 pm**	Guest lecture: Prof. Kun Pyo Lee from School of Design, Hong Kong Polytechnic University	
21	Tue, Oct 31	**Seminar 2**— Product stigmatization	[30, 31]
22	Thu, Nov 2 **4:30 pm**	Guest lecture: Prof. Pieter Jan Stappers from Industrial Design Engineering of Delft University of Technology	
23	Tue, Nov 7	**Seminar 3**—Human factors in cybersecurity contexts	[32, 33]
24	Thu, Nov 9	Interim presentation (group)	
25	Tue, Nov 14	**Seminar 4**— Behavioral decision making: Behavioral economics and design Submitting Exam 2 questions (scope: between #11 and #22, including the two guest lectures)	[34-36]
26	Thu, Nov 16	**Seminar 5**— Design for social behavior change	[37, 38]
27	Tue, Nov 21	Exam 2 / Course reflection (scope: between #11 and #22)	
28		**Thanksgiving break**	
29	Tue, Nov 28	Connecting inclusive design, human factors, and business	[39, 40]
30	Thu, Nov 30	In-class project work / Course reflection	
30	Thu, Dec 5	Final presentation	

References

1. Davis, J. and L.P. Nathan, *Value sensitive design: Applications, adaptations, and critiques.* Handbook of ethics, values, and technological design: Sources, theory, values and application domains, 2015: p. 11-40.
2. Spiekermann, S., *The challenges of privacy by design.* Communications of the ACM, 2012. **55**(7): p. 38-40.
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13. Pullin, G., *Designing for digital grandparents: How inclusion can be implicit yet inspire innovation*, A. Mieczakowski and J. Clarkson, Editors. 2012, University of Cambridge: London. p. 51-54.
14. Lim, Y., J. Giacomin, Y. Yin, and F. Nickpour, *A first-time investigation of psychosocial inclusivity in design: inclusive supermarket design for older individuals.* Journal of Design Research, 2019. **17**(2-4): p. 93-124.
15. Clarkson, J., C. Cardoso, and I. Hosking, *Product evaluation: Practical approaches*, R. Cooper, Editor. 2007, Routledge: London and New York. p. 181-196.
16. Keates, S. and J. Clarkson, *Quantifying design exclusion*. 2004, Springer: London. p. 124-139.
17. Cardoso, C. and J. Clarkson, *User simulation in product evaluation*, R. Cooper, Editor. 2007, Routledge: London and New York. p. 197-210.
18. Robinette, K.M., *Anthropometry for product design*, G. Salvendy, Editor. 2012, John Wiley & Sons. p. 330-346.
19. Norman, D.A., *Knowing what to do: Constraints, discoverability, and feedback*. 2013, Basic Books: New York. p. 123-161.
20. Djajadiningrat, T., K. Overbeeke, and S. Wensveen. *But how, Donald, tell us how? On the creation of meaning in interaction design through feedforward and inherent feedback*. in *Proceedings of the 4th conference on Designing interactive systems: processes, practices, methods, and techniques*. 2002.
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35. Lee, M.K., S. Kiesler, and J. Forlizzi. *Mining behavioral economics to design persuasive technology for healthy choices*. in *Proceedings of the sigchi conference on human factors in computing systems*. 2011.
36. Pfarr, N. and J. Gregory, *Cognitive Biases and Design Research: Using insights from behavioral economics and cognitive psychology to re-evaluate design research methods.* 2010.
37. Gardiner, E. and K. Niedderer, *Design for social behaviour change.* Design for Behaviour Change, 2017: p. 235-249.
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40. Pullin, G. and M. Bontoft, *Connecting business, inclusion and design*, J. Clarkson, R. Coleman, S. Keates, and C. Lebbon, Editors. 2003, Springer: London. p. 206-214.

LEARNING RESOURCES

READINGS

All reading materials, including papers and book chapters, will be distributed in a digital format via Cornell Canvas.

RECOMMENDED READINGS

- Friedman, B., & Hendry, D. G. (2019). *Value sensitive design: Shaping technology with moral imagination.* MIT Press. (Downloader on Cornell network— https://direct.mit.edu/books/book/4328/Value-Sensitive-DesignShaping-Technology-with)
- Salvendy, G. (Ed.). (2012). *Handbook of human factors and ergonomics*. John Wiley & Sons. (Downloadable at Cornell Library—https://newcatalog.library.cornell.edu/catalog/9310206)
- Tillman, B., Tillman, P., Rose, R. R., & Woodson, W. E. (2016). *Human factors and ergonomics design handbook*. McGraw-Hill Education.
- Coleman, R., Clarkson, J. O. H. N., & Cassim, J. (2016). Design for inclusivity: A practical guide to accessible, innovative and user-centred design. CRC Press. (Downloadable at Cornell Library— https://newcatalog.library.cornell.edu/catalog/9792574)
- Langdon, P. M., Lazar, J., Heylighen, A., & Dong, H. (2014). *Inclusive Designing*. Springer International Publishing, Cham. (Downloadable at Cornell Library— https://newcatalog.library.cornell.edu/catalog/8718807)
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- Office of Student Disability Services: https://sds.cornell.edu/
- Cornell Health CAPS (Counseling & Psychological Services): https://health.cornell.edu/services/counseling-psychiatry
- Undocumented/DACA Student support: In the Dean of Students office, contact Kevin Graham (Kevin.Graham@cornell.edu) and see the list of campus resources at https://dos.cornell.edu/undocumented-daca-support/undergraduate-admissions- financial-aid

This course follows the accommodations procedure of Cornell University policy. The request can be made through the student services. To facilitate all necessary aids and services in a timely manner, it is recommended that students send an early notification to the instructor—within the first two weeks of classes, or at least two weeks before accommodations are expected to begin. For more details, check the procedure at https://sds.cornell.edu.

ACADEMIC INTEGRITY

Absolute integrity is expected of every Cornell student in all academic undertakings. Integrity entails a firm adherence to a set of values, and the values most essential to an academic community are grounded on the concept of honesty with respect to the intellectual efforts of oneself and others. Academic integrity is expected not only in formal coursework situations, but in all University relationships and interactions connected to the educational process, including the use of university resources. While both students and faculty of Cornell assume the responsibility of maintaining and furthering these values, this document is concerned specifically with the conduct of students. A Cornell student's submission of work for academic credit indicates that the work is the student's own. All outside assistance must be acknowledged, and the student's academic position truthfully reported at all times. In addition, Cornell students have a right to expect academic integrity from each of their peers. The Cornell code of academic integrity is available at https://cuinfo.cornell.edu/aic.cfm.