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Spring 2020

AD 201-002: Human Factors/Ergonomics (Revised for Remote Learning)

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Human Factors:

AD-201 | Spring 2020

Wednesday 11:30 -2:20 P.M. | CKB 313 (From spring break on, class on webex)
Professor Mathew Schwartz | cadop@njit.edu
OFFICE HOURS: | Monday 10:00-11:00 AM and by appointment (webex)

Overview:

Human factors in design is often misunderstood and over simplified. This class is oriented around teaching students how to find information on human factors and test their designs on people. The most novel and revolutionary designs may not have a long history of user testing, and as such, to know how it functions the designer must know how to test it. Manufacturing technology, computational power, and understanding of the human have drastically changed in the last few decades, allowing designers to more accurately and correctly design for people. This class will discuss the strategies to understanding the human component of a design both in academics and in industry. Tools and techniques for how to record information using modern technology will be demonstrated. Through a series of lectures and exercises on various human subject topics students will be exposed to a broad range of human factors related to design.

Along with the testing of designs on people comes the ethical issues. This class will go over Institutional Review Board (IRB), a federal requirement for receiving approval of an ethical testing strategy that aligns with international treaties developed after the Nazi experiments. While many design firms (e.g., IDEO) will have their own regulations, the goal of ethical responsibilities and informed consent are paramount.

Plagiarism of outside work or other student work is not acceptable and will be reported to the dean of students, in many cases without notice. Students are expected to take notes in class, participate in discussions, and not work on other items during class time.

Ergonomics (or human factors) is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance.

Practitioners of ergonomics and ergonomists contribute to the design and evaluation of tasks, jobs, products, environments and systems in order to make them compatible with the needs, abilities and limitations of people.

International Ergonomics Association

Learning Objectives:

- Understand how and when to conduct human subject testing to understand a design
- Understand the ethics of using human subjects
- Learn the basics of how the human body moves and interact with the environment
- Develop a broad range of knowledge relating to tools and techniques for evaluating designs
- Understand the role of research and development in the design process
- Create a project that can be used in a portfolio to demonstrate to employers the ability to evaluate design

Schedule

Week Date	Topic (subject to change)	Information
1 January 22	Introduction	Class Expectations Student Introductions Homework: Human Factors
2 January 29	IRB + Ethics	Quiz: Human Factors (Text and Figures of Reading) Exercise 1
3 February 5	Anatomy	Due: IRB RCR Basic September 16th 10:00 PM Quiz: IRB Exercise 2
4 February 12	Movement I	Quiz: Anatomy
5 February 19	Movement II	Exercise 3
6 February 26	Movement III	Exercise 4
7 March 4	Eye Tracking	Exercise 5
8 March 11	Universal Design	Quiz: Movement
9 March 18 Spring Break. No Class		
10 March 25	Accessibility/Disabilities	Quiz: Universal Design Exercise 6 Due: Project Ideas
11 April 1	Surveys	Exercise 7
12 April 8	Data Analysis	Quiz: Surveys Due: Project Progress
13 April 15	Research Paper Reading	Quiz: Statistics Exercise 8
14 April 22	Electric Signals & Sensing	
15 April 29	Project Presentations	Due: Project April 28th 10:00 PM

Course Topics

Accessibility Project

This is a modification to the general accessibility project motivated by the COVID-19 virus pandemic. Accessibility is defined as:

" 1.1 The quality of being easy to obtain or use. ... 1.4 The quality of being easily reached, entered, or used by people who have a disability." (Lexico (Links to an external site.))

We use this definition to consider the ease of using and obtaining hygiene. Hygiene is defined as:

"Conditions or practices conducive to maintaining health and preventing disease, especially through cleanliness." (Lexico (Links to an external site.))

This refers to the ability to both access devices and locations as well as the basic premise of maintaining a persons health. Consider the items someone touches on the way to school or work. The door handles, bus seats, cell phones, ATMs, etc. What devices or objects are accessible in regards to hygiene? Also consider how people act themselves. How are diseases transmitted? Do they cover their mouth when coughing, touch their face, eat with their hands, rub their eyes? Through inspiration in research showing issues with these items, e.g., <https://elifesciences.org/articles/05154> (Links to an external site.)and [https://linkinghub.elsevier.com/retrieve/pii/S0196-6553\(14\)01281-4](https://linkinghub.elsevier.com/retrieve/pii/S0196-6553(14)01281-4) (Links to an external site.) , you will identify an issue with hygienic accessibility and illustrate a concept to solve it.

Presentation: The presentation time will be 5 minutes total. It should provide the problem statement, include literature and references to code or studies that demonstrate a design is poor, and a designed response that demonstrates how to solve the problem.

Quizzes: At various points in the class, a quiz will be given. No make-up time without a notice from the dean of students. Quiz material will be posted the day it is covered in the class. There will be a curve applied to the quiz category (if any student achieves a perfect score there is no curve).

Exercises: Multiple exercises will be done in class and as homework. All exercises will be submitted on canvas by each student (even if it is a group exercise, each student must submit themselves to receive a grade). Assignments started in class must be completed and submitted as homework.

Submission of Work: Per the School of Art & Design rules, all work must be uploaded to Kepler at the end of the year. A grade of **F** is given until this requirement is satisfied. Please note, I used to use an incomplete in the past, but the Dean of Students has made it clear that incompletes cannot be used for this.

Changes: Quizzes and Exercises may change as the semester progresses. Students are responsible for checking the updated syllabus in Canvas when modifications are made.

IRB Certification: The Institutional Review Board certifications are done through www.citiprogram.org. It is free for NJIT students. The minimum score is 80% to receive the certificate. Above this point, any score achieved is the score applied to that portion of the class grade. The name of the certificate is "RCR Basic". Submitting the correct PDF is required for a grade.

Grading

20% Participation (Answering questions, asking questions, engaging in activities, not working on other projects)

30% Exercises

30% Quizzes

10% IRB Certification. (Certificate grade (minimum 80%) is applied to the class grade)

10% Accessibility Project

GradeScale

A Superior

B+ Excellent

B Very Good

C+ Good

C Acceptable

D Minimum

F Inadequate

AU Audit

I Incomplete. Grade deferred--given in rare instances to students who would normally have completed the course work but who could not do so because of special circumstances. If this grade is not removed during the next regular semester, a grade of F will result.

W Withdrawn

S Satisfactory

U Unsatisfactory

Late Work:

Late work is accepted with a half ($\frac{1}{2}$) point reduction per hour after the deadline. Each hour is rounded up. For example, a grade of 95 will become a 92 if submitted 5.2 hours late. In the case of a presentation or quiz, this policy does not apply and make-up presentations are not accepted.

Readings

Readings will be provided and no books are required for purchase.

Plagiarism

Plagiarism refers to text, visual, and intellectual property. Not citing work, misleading during a presentation or submission on where the idea came from, or using words from a paper without quotations will be reported to the dean of students.

Lates

Arrival to class on time, and remaining for the duration of class, is mandatory. Attendance is taken at the beginning of class. If a student is late they must notify the professor at the class break (1.5 hours after the start) and have their name recorded as late. Not doing this will count as an absence and will affect the grade. Arrival later than 1.5 hours into class is recorded as absent. Each late is 2 points off of the participation grade. Each Absent is 5 points off of the participation grade.

University/College Rules

Academic integrity and honesty are of paramount importance in this class. The NJIT “University Code on Academic Integrity” will be upheld and any violation can, and will be, brought to the immediate attention of the Dean of Students by either a faculty member or student.

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 (1) letter grade for each additional absence, if you are not carrying a medical, school or religious related excuse. This means that any student who would have received an “A” will now receive a “B”, a “B+” reverts to a “C+”, etc. 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.

Students with disabilities should see me at the start of the semester to discuss any needs.

The syllabus is an outline for the class, and subject to change. Students are required to regularly check changes of the syllabus.

“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:

<http://www5.njit.edu/policies/sites/policies/files/academic-integrity-code.pdf>.

*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”*