

SYDE543: Cognitive Ergonomics
Department of System Design Engineering, University of Waterloo, Canada
Course Outline (Winter 2023)

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Office hours: via Microsoft Teams or see LEARN for 'live' times.

Teaching assistants: TBD

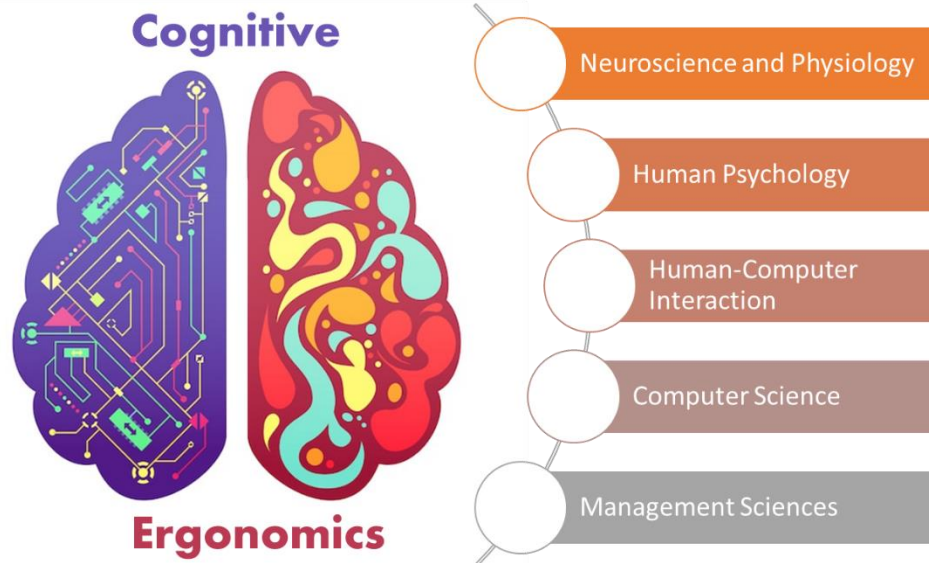


Figure 1: Scientific disciplines of Cognitive Ergonomics

Textbooks:

Wickens, C. D., Helton, W. S., Hollands, J. G., & Banbury, S. (2021). Engineering psychology and human performance. Routledge.

Forsythe, C., Liao, H., Trumbo, M. C. S., & Cardona-Rivera, R. E. (2014). Cognitive neuroscience of human systems: work and everyday life. CRC Press.

Gramann, K., Fairclough, S. H., Zander, T. O., & Ayaz, H. (2017). Trends in neuroergonomics. *Frontiers in human neuroscience*, 165.

LEARN:

Course slides and asynchronous lecture materials will be posted on LEARN. Students are allowed and encouraged to download materials for their own personal files but are not authorized to post SYDE543 materials on sites other than LEARN. Tests, ethics quiz, and assignments will be available and submitted using LEARN.

Course Description

SYDE 543, Cognitive Ergonomics covers elements of human cognition such as perception, memory, executive functions and motor response and their relationship when interaction with systems (e.g., computers, phones). Relevant topics include human physiology principles, mental workload, stress, human-computer interaction, training technology, virtual reality, user experience design and human-machine symbiosis. Cognitive ergonomics studies how well the use of a particular product or system matches the cognitive capabilities of their intended users.

This course is designed for senior, highly motivated and independent undergraduate students in Engineering who have a keen interest in human factors and human-computer interaction and who expect to pursue a career in areas of neuroscience and user experience. The course has a strong component of hands-on activities and it merges both theory and practical components to build concepts, prototypes and solutions for real-world applications rather than a purely theoretic course.

Course Objectives

The course aims to expand and consolidate on preliminary design skill sets developed in fundamental courses of system design and further acquire a better awareness of the important aspects to consider when using human factors to guide the design process. With a strong emphasis in cognitive factors associated with human performance, this course covers aspects that should be incorporated into the design process of systems involving end users, allowing for a more holistic understanding of user-centric design approaches. By the end of the course, students should be able to:

- A. Remember and comprehend important cognitive ergonomic concepts, theories, and principles.
 - Identify cognitive ergonomic issues in systems design
 - Analyze human information processing constraints and limitations
- B. Use important cognitive ergonomic research methods.
 - Design experiments and apply experimental design concepts when conducting research involving human subjects
 - Use tools for user modeling when designing systems with the human in the loop
- C. Apply cognitive ergonomic knowledge to accident analysis and systems design.
 - Identify cognitive ergonomic factors in incidents and accidents
 - Produce improved designs considering human cognitive constraint
- D. Sharpen social and professional skills.
 - Present in front of peer audiences with confidence
 - Create professional reports
 - Search, integrate, and use multimedia information in presentations and reports
- E. Acknowledge relevant aspects of inclusive design methodologies.

Instruction & Assessment

Students will be exposed to cognitive ergonomics methodologies and approaches related to design principles, including neuroscience and human physiology training, user experience and usability design via weekly in-person lectures, assignments, hands-on workshops, tutorials, analysis of case of studies and tests. See the weekly breakdown with more information of the topics covered.

Grade Breakdown

Ethics: 10%, Assignments: 50%, Test: 20%, Case Study: 10%, Tutorials: 10%,

- Ethics: ethics use case video 5%, presentation: 5%.
- Assignments: fist 20%, final project 30%
- Test: mid-term test 20%
- Case study presentation: 10%
- Tutorials: attendance and participation 10%

Email Policy

Microsoft Teams or email is the best way to get in touch with the instructor or TA. When sending an email, remember the following:

1. Emails should be sent from your official UW email account.
2. Put SYDE543 in the email subject line followed by a brief description of the email subject. For example, 'SYDE543: Question concerning FTA'.
3. Sign your email with your first and last name and your student number.
4. Emails should contain professional and respectful language.
5. While we will do our best to respond to your emails as soon as possible, allow 24 to 48 hours (excluding weekends) for a response to your email.
6. If your question or concern requires a complex answer or warrants a discussion, the instructor or teaching assistant may suggest a face-to-face meeting.

Course Schedule

The course schedule is posted on LEARN and details the following important information:

- a. Weekly course topics
- b. Associated textbook readings
- c. Assignments and/or other deliverables (tests, ethics, presentations)

Students are expected to review the course schedule, familiarize themselves with weekly expectations, and ask questions in advance of activities and associated deadlines to clear up any confusion. Changes to the course schedule will be announced as soon as possible and an updated course schedule will be posted on LEARN.

Note: We are facing unusual and challenging times. The instructor reserves the right to modify course topics and/or assessments with due notice. In the event of further challenges, the instructor will work with the Department to find reasonable and fair solutions.

COVID-19 Considerations:

There could be a need to make alternate arrangements for in-person course activities. This alternate arrangement could be for a short period of time (e.g., one week) or a more sustained disruption to in-person course activities. In the event of a disruption, all in-person lectures and tutorials will revert to synchronous, online lectures and tutorials.

Impacted in-person deliverables will be handled on a case-by-case basis with notification provided as soon as possible. The most likely scenario for the Test 1 and Test 2 would be an online test using the LEARN quiz tool available over a 12 hour period with a time limit to complete once started.

If you are unable to attend an in-person course activity due to emergency self-isolation, please let Professor Muñoz know as soon as possible. If this will impact more than one course, you are encouraged to inform the SYDE/BME Director. They will review your case and coordinate a reasonable and fair plan in consultation with appropriate others.

Please also see 'Fair Contingencies for Remote Teaching' below and 'Instructional Contingencies for Covid-19' in the next section.

Fair Contingencies for Remote Teaching.

We are facing unusual and challenging times. The course outline presents the instructor's intentions for course assessments, their weights, and due dates in Winter 2023. As best as possible, we will keep to the specified assessments, weights, and dates. To provide contingency for unforeseen circumstances, the instructor reserves the right to modify course topics and/or assessments and/or weight and/or deadlines with due and fair notice to students. In the event of such challenges, the instructor will work with the Department/Faculty to find reasonable and fair solutions that respect rights and workloads of students, staff, and faculty.

Turnitin.com

Text matching software (Turnitin®) may be used to screen assignments in this course. This would be done to verify that use of all material and sources in assignments is documented. Students will be given an option if they do not want to have their assignment screened by Turnitin®. Students will be provided about arrangements and alternatives for the use of Turnitin® in this course.

Writing and Communication Centre.

The Writing and Communication Centre works with students in all Faculties to help you consider your audience, clarify your ideas, develop your voice, and write in the style appropriate to your discipline. We offer one-on-one support for writing papers, delivering presentations, integrating research, and revising for clarity and coherence. Group appointments for team-based projects, presentations, and papers are also available.

All of our services are available virtually: booked appointments, drop-ins, resources, and writing groups. Check out our website for other ways to interact with us, such as open online forums and online "Question and Answers". Visit us at www.uwaterloo.ca/wcc.

Please note that communication specialists guide you to see your work as readers would. We can teach you revising skills and strategies, but will not change or correct your work for you.

Please bring your assignment instructions and any notes or drafts to your appointment.

[Link [Writing and Communication Centre](#)]