Department of Mechanical and Industrial Engineering
School of Graduate Studies
University of Toronto – St. George
Semester: Winter 2020
MIE1415 H – Analysis and Design of Cognitive Work

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CLASS TIME: Seminar**:** **Wednesday 6:00pm – 8:00pm**
Tutorial**:** **Wednesday 8:00pm – 9:00pm**

COURSE DESCRIPTION:

Frameworks, tools and methods to analyze and design support for cognitive work. The course will emphasize computer-based work in complex production- and/or safety-critical systems. Primary frameworks include Cognitive Work Analysis and Ecological Interface Design, with consideration of complementary perspectives in Cognitive Systems Engineering. The design element will emphasize the human-machine interface.

GOAL:

The goal of this course is to teach you how to analyze and design for human work in complex sociotechnical systems, such as power plant control rooms or intensive care units. This course will present a specific analysis and design approach that emphasizes the importance of understanding the structure of the work environment and presenting information in a form that takes advantage of mechanisms of human awareness. By the end of the course you will recognize the strengths and limitations of this approach; be able to apply it with discretion; and have the foundation to extend your knowledge through critical review of relevant academic and industry publications.

PREREQUISITES:

Completed MIE1401 "Human Factors Engineering", MIE523 "Engineering Psychology and Human Performance", Human Factors equivalent, or permission of the instructor.

REQUIRED TEXT:

- *Ecological Interface Design*, 2004, CRC Press; Catherine M. Burns and John Hajdukiewicz; ISBN-13: 978-0415283748.

SUPPLEMENTAL TEXTS:

- *Cognitive Work Analysis: Toward Safe, Productive, and Healthy Computer-Based Work,* 1999, CRC Press; Kim Vicente; ISBN-13: 978-0805823974.

- *Work Domain Analysis: Concepts, Guidelines, and Cases*, 2013, CRC Press; Neelam Naikar; ISBN-13: 978-0805861297.

- *Display and Interface Design: Subtle Science, Exact Art*, 2011, CRC Press; Kevin B. Bennett and John M. Flach; ISBN-13: 978-1420064384.

- *What Matters? Putting Common Sense to Work.* 2016, Wright State University Libraries; John M. Flach and Fred Voorhorst; http://corescholar.libraries.wright.edu/books/127/

CLASS FORMAT:

The course will consist of lectures, class discussions in seminars format, and a tutorial. Students are expected to attend the seminars and tutorials and to actively participate in the group discussions. For each class, a theme will be provided to guide students through the readings and activities, and to frame the seminars and discussions.

Teaching and learning is a shared responsibility, influenced by individual knowledge and experience. Your commitment, preparation, and active participation are important to your learning and the learning of your colleagues.

Course materials will be available on the University of Toronto learning portal (Backboard) together with assignments and announcements.

APPROACH:

Work analysis and interface design are best learned through trial and error experience, and by getting guidance and feedback from more experienced "coaches". The tutorial sessions provide both of these. Additional feedback and discussion are available through meetings with the instructors and TA. One thing to keep in mind during these meetings is that there is usually more than one correct way to perform an analysis or design, but there are always an infinite number of incorrect ways.

DELIVERABLES:

Proposal: Present a compelling one-page problem description and proposal for an interface design project that suits the Ecological Interface Design (EID) framework, and is feasible within your resources and the course timeline. The top 33% (or so) proposals will be selected as design project topics. Authors of selected proposals will be asked to make a 2 minute presentation of their proposal/ideas in-class.

Work Domain Analysis (WDA) Quiz: An in-class test of your understanding of the theoretic concepts used in the WDA framework.

Work Domain Analysis Report: Present your group's work analysis of your chosen project topic. Explicitly define your system boundary, system purposes, underlying principles, processes, and functions. Account for the availability of each of the information requirements that you identify.

Ecological Interface Design Specification: Prepare a design specification of your interface in enough detail for a software developer to implement your design. The specification should include and refer to a prototype of your interface design. The specification must explain the rationale behind your design so that the implementer can make changes without compromising your design philosophy. Refer to relevant standards where appropriate.

Evaluations	Worth	Due Dates
Project Proposal	3%	Jan 26th, 2020
WDA Quiz	3%	In-class Feb. 12th, 2020
Work Domain Analysis Report	30%	Feb. 24th, 2020
Class Presentation	10%	Apr. 8th, 2020
Ecological Interface Design Specification	50%	Apr. 13th, 2020

The penalty for late assignments is set to **5% per day**.

Important Dates

First class:	January 8th, 2020
Deadline to enrol in Winter courses:	January 20th, 2020
Last day to drop Winter courses without grade:	February 24th, 2020