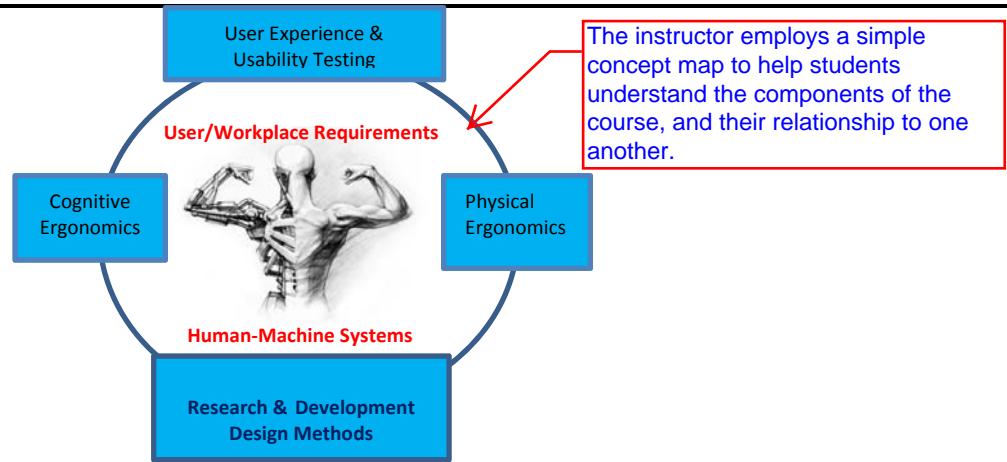


Click here to listen to an audio overview of the noteworthy features of this course outline.

**SYDE 162 Human Factors in Design
Systems Design Engineering,
University of Waterloo
Course Outline (Spring 2013)**



The instructor employs a simple concept map to help students understand the components of the course, and their relationship to one another.

COURSE OVERVIEW

SYDE 162, *Human Factors in Design*, is the second course in the SYDE Design course sequence. We will extend learning from SYDE 161 *Introduction to Design* and SYDE 101 *Introduction to Systems Design Engineering* by focusing on user/workplace requirements as they apply to the design of human-machine systems. In *Human Factors in Design* we will introduce students to the discipline of human factors engineering and how it informs design decisions to improve design outcomes from the perspective of overall safety and performance.

MEETING TIMES & INSTRUCTIONAL METHODS

In-Class Sessions

Participation Lectures/Workshops:	Mondays & Fridays	12:30 pm – 2:20 pm (E5 6008)
Case Studies & Q/A:	Wednesdays	1:30 pm – 2:20 pm (E5 6008)

REQUIRED MATERIALS

Textbooks (for Open-Book Exams)

1. Wickens, C.D., Lee, J.D., Liu, Y., & Becker, S.E.G (2004) *An Introduction to Human Factors Engineering*, 2nd edition. Upper Saddle River NJ: Pearson Prentice Hall. **(OR EQUIVALENT)**
2. Casey, S. (1993) *Set Phasers on Stun: And Other True Tales of Design, Technology, and Human Error*. Santa Barbara CA: Aegean Publishing Company.

Design Materials: Students will be expected to come to class with paper, pens, and sticky notes for completing in-class activities. Instructors may also specify the use of mobile phones, digital cameras, and laptops for some activities.

Supplemental Materials to be posted on UW LEARN: UW LEARN is the official site for posting of materials related to SYDE 162. Prof MacGregor does not authorize the posting of SYDE 162 materials on other sites. Each student is responsible for his/her own learning which includes staying current with postings on LEARN.

INSTRUCTIONAL TEAM

Professor: Prof. C. MacGregor, Ph.D, CCPE
Office: DWE 2510
E-mail: cgmacre@uwaterloo.ca
Voice: 519-888-4567, ext 32897

Teaching Assistants: Jennifer Howcroft (Lead TA)
Jingru Yan
Email: j2irwin@uwaterloo.ca
j56yan@uwaterloo.ca

The instructor identifies the Intended Learning Objectives for the course, and then shows how each assignment and assessment is connected to those Intended Learning Objectives. The instructor also indicates whether a given piece of feedback is formative or summative in nature.

INSTRUCTIONAL AND ASSESSMENT METHODS

Students will be exposed to human factors engineering concepts and analytical techniques relating to user experience/usability design, physical workplace design, and complex system design through in-class lectures, workshop-style skill development, case studies, class discussion, and assignments done by individuals and teams.

Intended Learning Objectives & Assessments:

Expand design skill sets for identifying user requirements in human-machine systems by incorporating learning from areas of research & development, cognitive ergonomics, physical ergonomics, and user experience

	Assessment Methods			
	Individual Participation Submissions	Team Projects 1) Product Usability 2) Workstation	Midterm Exam	Final Exam
	Weekly	1) Weeks 1-5 1) Redesigns: June 4-8 2) Weeks 7-10 2) Redesigns: July 22-26	Week of June 10-14	TBD
Intended Learning Objectives				
1. Define and describe key HFE concepts that are fundamental to HFE design principles and guidelines	On-line & In-class activities (submitted) [F]		Part A (multiple choice/ short answer) [F/S]	Part A (multiple choice/ short answer) [S]
2. Evaluate user requirements in the context of user and workplace characteristics	On-line & In-class activities (submitted) [F]	Project 1 (Usability); Lab 1-5 (Workstation) [F/S]	Part C Design scenario [F/S]	Part C & D Design scenario(s) [S]
3. Apply HFE concepts to case studies and real-world design problems	On-line & In-class activities (submitted) [F]		Part B Case Study analysis [F/S]	Part B Case Study/ News Article analysis [S]
4. Propose and critique redesign solutions for case studies and real-world problems based on HFE methods	On-line & In-class activities [F]	Project 1 (Usability); Lab 1-5 (Workstation) [F/S]	Part C Design scenario [F/S]	Part C & D Design scenario(s) [S]
5. Propose basic user testing protocols	TCPS-2CORE [S]	Lab 5 – User Requirements & Ethics (w Project 1 Team) [S]		
Course Grade Weighting	10%	35% P1 (15%) Lab 1-5 (20%)	25% <i>(If FE>MT re-weight 15%)</i>	30% <i>(If FE>MT re-weight 40%)</i>

[F = Formative Feedback; S = Summative Feedback]

Individual Participation Submissions:

- TCPS-2 CORE Tutorial
 - 4% = 4/4 if done by end of Week 2; 3/4 if after Week 2 but before midterm; 2/4 if after midterm but before Week 10; 1/4 if after Week 10 but before Final Exam.
- Individual Submissions
 - 6% (each opportunity worth 0.5) = 8 opportunities before midterm; 8 opportunities after midterm

EXPECTATIONS AND TIPS FOR SUCCESS:

Academic Standards and Workload: Appropriate professional tone and academic referencing are expected on all student submissions and examinations (open-book). This is to maintain academic integrity, as well as to help build strong professional practice skills. SYDE students should be aware that to create design course grading rubrics, we apply the general grading rubric principles that appear in *SYDE 000 Style Manual* (students should have had exposure to the SYDE Style Manual in SYDE 161 and SYDE 101). A typical SYDE course should require 8-10 hours per week. In SYDE 162 that means 5 hours in-class time plus 3-5 hours of out-of-class to work on readings, pair assignments, and team projects. This time may vary depending on how quickly you read and comprehend assigned course materials.

Class Room Protocol: We are all expected to know and follow the University of Waterloo's policies relating to Academic Integrity and Inclusive Classroom Environments. Students are expected to be courteous and respectful of others, and mindful that a classroom is a shared working space with the primary goal of learning course material. Unnecessary distractions are to be minimized – that includes turning off cell phones and other distracters during lectures and design activities. If for some reason you arrive late then enter through the back door of the classroom and move quietly to the nearest vacant seat when it is appropriate to do so. Laptops can be distracting to those around you. To minimize distractions, laptops are permitted in the back row of the classroom only, unless the instructor has specifically requested use of laptops for an in-class activity.

Course Assignments & Deliverables (Posting, Submissions, and Feedback): Instructions for course assignments and deliverables will be posted in UW-Learn (SYDE 162). Students will upload relevant documents to appropriate electronic dropboxes. As appropriate, feedback to individuals and teams will be provided electronically.

Deadlines and Late Penalties: Course deliverables submitted after the due date will be assigned a grade of zero (0). *This penalty may be waived at the discretion of the instructor in the event of extraordinary or special circumstances (with supporting verification/documentation).*

Individual Participation Submissions: These are short activities that you submit for participation credit. Each is graded as "1" (reasonable attempt) or "0" (not reasonable or missing). Each participation activity is worth 0.5%. Students may earn up to a maximum of 10% for Participation Activities. Most individual participation activities will be done at random times during in-class sessions. Once the participation activity is asked to be handed in, then that participation opportunity is over.

Team Projects: Team Projects are mandatory in SYDE 162 (2013). For course assignments involving teamwork, the instructor reserves the right to modify team project requirements, and/or remove a student from a team project should circumstances be warranted.

Team Project Participation:

As with any SYDE design course, students are expected to participate and contribute equitably to teamwork/project components. Students with unauthorized absence, lateness, or lack of participation at specified team workshop sessions may have penalties imposed by way of differential grading on marks relating to team-based assignments/projects (up to 45% of the final grade).

Absence Due to Special Circumstances or Illness: Let Dr. MacGregor know in advance if you need to be away due to special circumstances. If the event conflicts with scheduled design activities, then verification of the reason for absence is needed. In the event of illness that prevents attendance or participation in mandatory course activities, a Health Services Verification of Illness form must be completed by an authorized medical practitioner. See http://www.healthservices.uwaterloo.ca/Health_Services/verification.html.

Communication Methods: Most communications regarding SYDE 162 will be done during class sessions. Special announcements will be posted in the "NEWS Update" section on LEARN. Emails sent to students will be done through LEARN, and sent to UW student accounts. In keeping with SYDE practices, students emailing SYDE 162 Instructional team must use their UW email account and include full student name, and student ID number.

FACULTY OF ENGINEERING – MORE FINE PRINT

http://www.eng.uwaterloo.ca/~ugoffice/html/course_responsibilities.html

Academic Integrity: In order to maintain a culture of academic integrity, members of the University of Waterloo community are expected to promote honesty, trust, fairness, respect and responsibility.

[Check www.uwaterloo.ca/academicintegrity/ for more information.]

Discipline: A student is expected to know what constitutes academic integrity (see link above) to avoid committing an academic offence, and to take responsibility for their actions. A student who is unsure whether an action constitutes an offence, or who needs help in learning how to avoid offences (e.g. plagiarism, cheating) or about “rules” for group work/collaboration should seek guidance from the course instructor, academic advisor, or the undergraduate Associate Dean. For information on categories of offences and types of penalties, students should refer to *Policy 71, Student Discipline* www.adm.uwaterloo.ca/infosec/Policies/policy71.htm. For typical penalties check *Guidelines for the Assessment of Penalties*, www.adm.uwaterloo.ca/infosec/guidelines/penaltyguidelines.htm.

Grievance: A student who believes that a decision affecting some aspect of their university life has been unfair or unreasonable may have grounds for initiating a grievance. Read *Policy 70, Student Petitions and Grievances, Section 4* www.adm.uwaterloo.ca/infosec/Policies/policy70.htm. When in doubt please be certain to contact the department’s administration who will provide further assistance.

Useful website: http://arts.uwaterloo.ca/arts/ugrad/academic_responsibility.html

Appeals: A decision made or penalty imposed under Policy 70 (Student Petitions and Grievances) (other than a petition) or Policy 71 (Student Discipline) may be appealed if there is a ground.

A student who believes they have a ground for an appeal should refer to Policy 72 (Student Appeals) www.adm.uwaterloo.ca/infosec/Policies/policy72.htm.

Note for Students with Disabilities: The Office for Persons with Disabilities (OPD), located in Needles Hall Room 1132, collaborates with all academic departments to arrange appropriate accommodations for students with disabilities without compromising the academic integrity of the curriculum. If you require accommodation to lessen the impact of your disability, please register with OPD at the beginning of each academic term.

SYDE 162 HUMAN FACTORS IN DESIGN (2013) – WEEKS 1-13
TENTATIVE WEEK-BY-WEEK SCHEDULE (may be subject to revisions)

WEEK	MAIN THEMES	Required Readings	MONDAY In-Class Sessions (Activities/Deliverables)	WEDNESDAY (Case Studies/Q&A)	FRIDAY In-Class Sessions (Activities/Deliverables)
1. May 6,8,10	Human Factors & User Requirements Usability Basics (1)	Wickens: Chp 1,2, 3 Chp 14 (366-369) Casey: Set Phasers on Stun	MAY 6 Project 1 Launch Project 1 Team Membership <i>Participation #1 (in-class)</i>	MAY 8 Case Study Set Phasers on Stun <i>Participation #2 (in-class)</i>	MAY 10 Project#1 Components Due: 1) Situation of Concern 2) Picture (s) of Current Design 3) Personas 4) User Requirements <i>Participation #3(in-class)</i>
2. May 13+, 15, 17	Usability Basics (2) Cognitive Ergonomics (1) Signal Detection & Information Processing Models	Wickens Chp 15 (383-410) Chp 4, 5, 6 Casey: Wizard of Wall Street Never Cry Wolf	MAY 13+ (EXTRA CLASS TIME) Project#1 Components Due: 1) Design Walkthroughs using Norman’s Principles 2) Heuristic Evaluations Using Nielsen’s Principles	MAY 15 Case Study Never Cry Wolf Wizard of Wall Street <i>Participation #4 (in-class)</i>	MAY 17 CANCELLED (LONG WEEKEND)
3. May 22, 24	Hazard Analysis (1)	Wickens Chp 14 Casey: Business in Bhopal	May 20 VICTORIA DAY – HOLIDAY (NO CLASS)	MAY 22 Case Study Business in Bhopal <i>Participation #5 (in-class)</i>	MAY 24 Project#1 Components Due: 1) Hierarchical Task Analysis 2) Fault Tree Analysis
4. May 27, 29 & 31	Cognitive Ergonomics (2) Stimulus to Response; Decision-Making	Wickens Chp 7, 8, 9 Casey: Rental Car Double Vision	MAY 27 Project#1 Components Due: 1) Compliance with Principles of Controls & Displays	MAY 29 Case Study Rental Car Double Vision <i>Participation #6 (in-class)</i>	MAY 31 Project#1 Components Due: Preview of Project 1 Redesigns <i>Participation #7 (in-class)</i>
5. June 3, 5 & 7	Project 1 Presentations & Retrospective Midterm Review	All assigned readings, methods, and concepts	JUNE 3 Project #1 Redesign Presentations	JUNE 7 Project#1 Retrospective	JUNE 8 MIDTERM REVIEW <i>Participation #8 (in-class)</i>
6. June 10, 12 & 14	Midterm Week	All assigned readings, methods, and concepts	JUNE 10 MIDTERM WEEK - NO CLASS	JUNE 12 MIDTERM	JUNE 14 MIDTERM WEEK - NO CLASS

SYDE 162 HUMAN FACTORS IN DESIGN (2013)					
WEEK	MAIN THEMES	Required Readings	MONDAY In-Class Sessions	WEDNESDAY (Case Studies)	FRIDAY In-Class Labs
7. June 17+, 19 & 21	Physical Ergonomics (1) Anthropometrics	Wickens: Chp 10 Casey: Tigershark! Return for Salyut	JUNE 17+ (EXTRA CLASS) LECTURE: <ul style="list-style-type: none"> • Explanation for Lab-Approach (Weeks 7-13) • Meet Lab Group Members • Anthropometric Basics <i>Participation # 9 (in-class)</i>	JUNE 19 Case Study <ul style="list-style-type: none"> • Tigershark! • Return for Salyut <i>Participation #10 (in-class)</i>	JUNE 21 LAB 1 – DUE BY 5:00 PM ANTHROPOMETRICS (4%) <ul style="list-style-type: none"> • Use measurements and anthropometric tables to establish user requirement specifications for a design scenario
8. June 24, 26 & 28	Physical Ergonomics (2) Biomechanics	Wickens: Chp 11	JUNE 24 LECTURE: <ul style="list-style-type: none"> • Biomechanics Basics • NIOSH Lifting Equation <i>Participation #11 (in-class)</i>	JUNE 26 Midterm Exams Returned (tentative)	JUNE 28 CANCELLED (LONG WEEKEND)
9. July 3 & 5	Physical Ergonomics (3) Work Analysis & Automation	Wickens: Chp 16; Chp 1 Review, 37 -50; Chp 10 Review,262-268 Casey: Leap of Faith; New FangledTechnology	JULY 1 CANADA DAY – HOLIDAY (NO CLASS)	JULY 3 LECTURE: <ul style="list-style-type: none"> • Humans & Automation Case Studies: <ul style="list-style-type: none"> • New Fangled Technology • Leap of Faith <i>Participation # 12 (in-class)</i>	JULY 5 LAB 2 – DUE BY 5:00 PM WORK FLOW ANALYSIS (4%) <ul style="list-style-type: none"> • Use Hierarchical Tasks Analysis and Link Analysis to redesign a workspace
10. July 8, 10 & 12	Physical Ergonomics (4) Work Demands Analysis	Wickens: Chp 12 & 13 (See Final Exam Concept list for focused readings) Casey: Act of God	JULY 8 LECTURE: <ul style="list-style-type: none"> • Physical and Mental Demands • Stress & Mental Workload • Fatigue & Vigilance <i>Participation # 13 (in-class)</i>	JULY 10 Case Study: <ul style="list-style-type: none"> • Act of God <i>Participations # 14 (in-class)</i>	JULY 12 LAB 3 – DUE BY 5:00 PM WORK DEMANDS ANALYSIS (4%) <ul style="list-style-type: none"> • Use Ergonomic Checklists to do preliminary assessments of different jobs to identify risks.
11. July 15, 17 & 19	Macro-Ergonomics (1) Personnel Selection & Training	Wickens: Chp 18 Gamification Reading	JULY 15 LECTURE: <ul style="list-style-type: none"> • Selection & Training Basics • Questionnaire Development <i>Participation # 15 (in-class)</i>	JULY 17 LECTURE: <ul style="list-style-type: none"> • Gamification & Training (for Lab 4) 	JULY 19 LAB 4 – DUE BY 5:00 PM ETHICS REVIEWS (4%) <ul style="list-style-type: none"> • Use basic UW ORE forms to describe human factors study.
12. July 22, 24 & 26	Macro-Ergonomics (2) Organizational Factors & Teams	Wickens: Chp 19 Casey: Chutes & Ladders Silent Warning Peppermint Twist	JULY 22 LECTURE: <ul style="list-style-type: none"> • Organizational Basics • Collaborative Work <i>Participation # 16 (in-class)</i>	JULY 24 Case Studies: Chutes & Ladders Silent Warning Peppermint Twist	JULY 26 LAB 5 – DUE BY 5:00 PM USER REQUIREMENTS (4%) <ul style="list-style-type: none"> • Revisiting User Requirements from Project 1.
13. July 29, 30	Course Wrap-Up	Review assigned readings	JULY 29 LECTURE: <ul style="list-style-type: none"> • Emerging trends in human factors engineering 	JULY 30 (Monday schedule to replace holidays) FINAL EXAM REVIEW	LAB REVISIONS – Due Monday, July 29 by 11:45 pm