COURSE DESCRIPTION

Human factors (or cognitive ergonomics) refers to the study of how people interact with their work and living environments. This course is designed to provide an intermediate level review of the principles of this science by presenting a systematic application of relevant information about human capabilities, limitations and behaviours with regard to the design of usable elements (e.g., machines, spaces, etc.) within specific environments. Emphasis will be placed on the interactive nature of human-machine systems, the development of cognitive ergonomic models and, the techniques used to assess the design of modern workplaces from a human performance perspective.

COURSE OBJECTIVES

The primary aim of this course is to provide students of kinesiology with the human factors information necessary to understand, analyze, and design modern living and work environments. In addition, the course will allow students the opportunity to observe, appreciate and, discover how the principles of motor behaviour and control are applied to the performance and learning of everyday skills. Upon completion of this course, the student should:

1) Understand the relevance of human-information processing and human-machine interface models for cognitive ergonomic design,

2) Have acquired functional skills for the Human Factors assessment of products and human-machine systems,

3) Understand the fundamental requirements of conducting an Human Factors analysis of a work or living environment.

COURSE FORMAT

The class will meet three times each week. Course performance is assessed through the completion of verbal and written assignments as well as performance on in-class quizzes.

Some note on readings/lecture notes/class attendance and lectures

You are expected to attend every class. The readings and lectures will both overlap and complement each other. The lectures are designed to expand and elaborate on the readings and the readings on the lectures, neither is a substitute for the other. Written information contained in
lecture notes will be made available via Avenue to Learn (see also the section on On-Line Resources below). These will typically (but perhaps not always) be available before the class. However, please be aware that the lectures might depart from the notes on Avenue and there will be additional information conveyed in the class that may not appear in the lecture notes. It is YOUR responsibility to cross-check the notes with others if you miss a class. If in-class attendance drops, notes will NOT be posted on Avenue.

**REQUIRED TEXT**

Kinesiology 4V03 Custom Courseware Package. In addition to the required readings in this package, topical readings will be placed on-line through Avenue to Learn or on library reserve from time to time.

**EVALUATION**

**Tests and Exams:**
- Quiz 1 (30%) Wednesday, October 5
- Quiz 2 (30%) Friday, November 25

**Assignments:**
- Research Proposal Outline (5%)
- Research presentation (10%)
- Written paper (25%)

**POLICY REGARDING CONFLICTS WITH TESTS AND ASSIGNMENTS**

University policy provides provision for possible accommodation for missed work worth less than 25% of your final grade, for absences (minor medical reasons lasting fewer than 3 days), using the McMaster Student Absence Form (msaf). Please note that both the tests and the final written paper in this course are valued at or greater than 25% of your final grade. As such, accommodation for rewriting these tests will not be granted through the msaf process.

However, students who miss the in-term tests or any other evaluated work for legitimate reasons such as illness, may be allowed to write a deferred or "make-up" test. In all instances, appropriate documentation must be submitted to the Office of the Associate Dean, Faculty of Science. In situations where the Office of the Associate Dean deems sufficient merit in the request, alternative arrangements regarding test deferral or assignment extensions will be made by the course instructor. Please note that in order to maintain the greatest degree of fairness, these alternative times will be within two school days of the originally scheduled test or assignment. If circumstances do not allow for the make-up work to be completed during this time frame, a final opportunity to write any missing tests will be held on Friday, December 2nd, 9:30-10:30 am or 2:30-3:30 pm. Note: it is the student’s responsibility to initiate accommodation arrangements for missed work. Failure to do so will result in a grade of zero for the missed work.

**DROP BOXES**

Course drop boxes are located on the second floor of the IWC near IWC 224 (please do not place assignments in the administrative drop box located outside IWC 219C).

**ACADEMIC INTEGRITY**
Academic dishonesty consists of misrepresentation by deception or by other fraudulent means and can result in serious consequences (e.g. the grade of zero on an assignment, loss of credit with a notation on the transcript reading "Grade of F assigned for academic dishonesty", and/or suspension or expulsion from the university). It is your responsibility to understand what constitutes academic dishonesty. For information on the various kinds of academic dishonesty please refer to the Academic Integrity Policy, specifically Appendix 3, located at: http://www.mcmaster.ca/univsec/policy/AcademicIntegrity.pdf

The following illustrates only three forms of academic dishonesty:

- Plagiarism (e.g. the submission of work that is not one's own or for which other credit has been obtained),
- Improper collaboration in group work,
- Copying or using unauthorized aids in tests and examinations.

TURNITIN.COM

In this course we will be using a web-based service (Turnitin.com). Students will be expected to submit their work both electronically and in hard copy. Students who do not wish to submit their work electronically must still submit a copy to the instructor. No penalty will be assigned to a student who does not submit work electronically. To see the Turnitin.com Policy, please go to www.mcmaster.ca/academicintegrity

ACADEMIC ACCOMMODATION OF STUDENTS WITH DISABILITIES

Students who require academic accommodation must contact Student Accessibility Services (SAS) to make arrangements with a Program Coordinator. Academic accommodations must be arranged for each term of study. Student Accessibility Services can be contacted by phone 905-525-9140 ext. 28652 or e-mail sas@mcmaster.ca. For further information, consult McMaster University’s Policy for Academic

POLICY ON THE USE OF CALCULATORS IN EXAMINATIONS

University approved calculators may be used during tests and examinations.

ON-LINE LEARNING RESOURCES

This course is subscribed to Avenue to Learn. As a student registered in this course, you will be able to log-in to this site at any time and access certain elements of course content. On this site we will post lecture outlines, assignment information, discussion forums and other materials pertinent to the course. Please note that these materials are provided to guide you through in-class lectures and assist in developing a structured framework for learning. Because certain information may not be included in these on-line resources, they are NOT to be considered substitutes for lectures. Students should be aware that, when they access the electronic components of this course, private information such as first and last names, user names for the McMaster e-mail accounts, and program affiliation may become apparent to all other students in the same course. The available information is dependent on the technology used. Continuation in this course will be deemed consent to this disclosure. If you have any questions or concerns about such disclosure please discuss this with the course instructor.
SOME NOTE ON READINGS/LECTURE NOTES/CLASS ATTENDANCE AND LECTURES

You are expected to attend every class. The readings and lectures will both overlap and complement each other. The lectures are designed to expand and elaborate on the readings and the readings on the lectures; neither is a substitute for the other. Written information contained in lecture notes will be made available via Avenue to Learn (see also the section on On-Line Resources below). These will typically (but perhaps not always) be available before the class.

However, please be aware that the lectures might depart from the notes on Avenue and there will be additional information conveyed in the class that may not appear in the lecture notes. It is YOUR responsibility to cross-check the notes with others if you miss a class. If in-class attendance drops, notes will NOT be posted on Avenue.

Computer use in the classroom is permitted but please note that such use is intended solely to facilitate learning (e.g., note taking, viewing posted material, etc.) for that particular lecture. University policy stipulates that, at the discretion of the instructor or TA, students using a computer in class for any other purpose will be required to turn it off immediately. We would also kindly ask that all cell phone be set to silent mode before the lecture begins.

MODIFICATIONS TO COURSE

The instructor and university reserve the right to modify elements of the course during the term. The university may change the dates and deadlines for any or all courses in extreme circumstances. If either type of modification becomes necessary, reasonable notice and communication with the students will be given with explanation and the opportunity to comment on changes. It is the responsibility of the student to check their McMaster email and course websites weekly during the term and to note any changes. Note: Details, updates, and/or changes to this course outline will be announced in class and posted on Avenue to Learn.

OTHER ISSUES

- Full attendance is expected at all lectures.
- Students, whose attendance or performance is severely affected by medical, emotional or other disabilities, should consult with me early in the term to discuss special arrangements. Supporting documentation must be provided.
- Please let us know in advance, preferably in the first week of class, if there are any special learning requests or requirements
- Students who plan to be absent for varsity athletics, family obligations or other similar commitments should discuss these commitments with us before the withdrawal date.
- All notes posted on Avenue to Learn are the intellectual property of the instructor and are not to be redistributed without permission.
- Should you wish to record a lecture (in any format, whether audio or audio-visual) you must seek the permission of the instructor before the lecture begins and you will need to explain the reason for wishing to record the lecture. Note that any such recording will be permitted only for the purposes of private study by the individual student. Students may not distribute, email, electronically post, or otherwise communicate these materials to any other person.
**FEEDBACK**

It really helps us improve our services when we hear from our students, faculty and staff about what we can do better. A feedback process brings to our attention situations in which we may not have adequately considered accessibility and allows us to better plan for accessibility in the future.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Readings</th>
</tr>
</thead>
</table>
| **INTRODUCTION** | Beyond Human Error: Human Factors in Safety Investigations  
Human Factors Defined  
Historical Background  
Foundations of Human Factors |
| **HUMAN-MACHINE SYSTEMS** | Reliability and Human Error in Systems  
Business in Bhopal  
Beyond Human Error: Human Factors in Safety Investigations  
Foundations of Human Factors |
| Characteristics | Beyond Human Error: Human Factors in Safety Investigations  
Foundations of Human Factors |
| Reliability | Reliability and Human Error in Systems  
Business in Bhopal  
Beyond Human Error: Human Factors in Safety Investigations  
Foundations of Human Factors |
| Human Error | Beyond Human Error: Human Factors in Safety Investigations  
Foundations of Human Factors |
| Information Theory | Beyond Human Error: Human Factors in Safety Investigations  
Foundations of Human Factors |
| **HUMAN INFORMATION-PROCESSING** | Divided Attention and Workload |
| A 3-Stage Model | Divided Attention and Workload |
| Signal Detection Theory | Divided Attention and Workload |
| Memory | Divided Attention and Workload |
| Attention and Mental Workload. | Divided Attention and Workload |
| **SENSORY INPUTS** | None |
| The visual system | None |
| Perception of Basic Properties | None |
| **DISPLAY OF SENSORY INFORMATION** | None |
| Visual | None |
| Auditory | None |
| Olfactory | None |
| Tactile | None |
| **CONTROLS AND CONTROLLING ACTIONS** | Controls and Data Entry Devices. |
| Control Panels and Arrangements | Controls and Data Entry Devices. |
| Data Entry Devices/HCI | Controls and Data Entry Devices. |
| **PRINCIPLES OF COMPATIBILITY** | Design for Action  
Design Follies |
| Conceptual & Modality | Design for Action  
Design Follies |
| Movement | Design for Action  
Design Follies |
| Spatial | Design for Action  
Design Follies |
| **HUMAN FACTORS AND AGING** | Sensory and Perceptual Functioning: Basic Research and Human Factors Implications  
Unintended Acceleration: A Review of Human Factors Considerations |
| **SUMMARY AND CONCLUSIONS** | Optimizing Performance Through Workplace Design |
THE RESEARCH PROJECT

Human Factors covers a wide and diverse range of topics. The literature covered in the lectures and the readings afford a good starting point but will still only provide a general overview of the area. The purpose of these assignments is to have you explore a topic area in greater depth and share this research with your classmates.

The Research Proposal

A research proposal is a prescription for new research. For Human Factors research, the proposal is normally a prescription for a new experiment that tests an idea or hypothesis generated from knowledge about previous work in the area. For this project, you are free to choose a topic from any of the research areas that were discussed in class, the courseware pack, or anything else that is appropriate and interests you. A fully developed proposal requires a thorough understanding of the previous research. This involves a library search in order to uncover the most recent and important research papers that have been published in that area, as well as the older literature. Once these are uncovered, you should develop the research methods normally used in order that the design of your proposed experiment is both consistent with previous methods yet is innovative in its goals and hypotheses. In other words, the research proposal should be well grounded in theory, it should be innovative, and the methods proposed to investigate the topic should be logical and appropriate. A good strategy is to first do some reading in order to come up with a general idea of what kind of topic(s) interest you. Scanning the topics in the course readings is a good start. Then make an appointment with the instructor or T.A. to discuss your ideas, to gain some insight into how to take your ideas to the next level. At that point you are ready to begin to read the primary literature in the area. Google Scholar, PubMed and the Web of Science are great resources in finding primary resources.

Outline of Research Proposal

A one-page (maximum) single-spaced outline of the research proposal must be submitted. The purpose of the outline is to help you get started to organize your thoughts about the research project. It is not expected that the proposal will have been completely developed by this time. However, the outline must provide evidence that a research idea has been formulated, that some initial discovery of the literature has been undertaken, and that some preliminary thinking about a potential methodology has been considered.

The research proposal is due by 4:30 pm on Monday, October 26, 2015. Late outlines will be assessed a penalty of 1% of the final course grade for each day late.

Written Proposal

The written portion of this assignment should be suitable for publication in a Human Factors related journal. That is, the paper should be written in a style that is easy to understand but which also relies on scientific evidence to substantiate your work. The paper should: Describe your topic in detail, have clear and well defined relevance to human factors specialists or designers and include recommendations that will adhere to how we define Human Factors.

Specifically, the written proposal should include:

a) a thorough review of the previous literature on the topic area that concludes with,
b) a logical and theoretically significant question about what is not known in that area of research and,
c) logical hypotheses about what you think the methods in your study will uncover about the area. Following this introduction, the proposal should include a description of the methods used to test your ideas including,
d) the subjects (number, age, gender, etc.),
e) a description of the task and materials and,
f) details of the procedures to be followed in the experiment. The proposal should also include,
g) graphs of how the results are predicted to turn out and,
h) a full list of cited references conforming strictly to the publication style of the American Psychological Association.

The proposal must be no more than 12 pages in length (including everything), double-spaced, 2.5 cm margins all around, and in 12 point font. In summary, the written research proposal is similar to a paper that you will find in a journal, but without the actual Results and the Discussion sections.

The paper is due no later than 4:30 pm on Monday, November 30th, 2015. If you wish to hand in your paper earlier,.05% bonus marks will be added for each day it is early (to a maximum of 2 bonus marks). Late papers, on the other hand, will be assessed a penalty of 2% of the final course grade, for each day late.

Presentation of Research Proposal

Your proposal will be presented to the entire class during our annual Human Factors Conference (December 1-8, 2015). The key component of this aspect of the assignment is to verbally communicate your ideas to others – you will have worked hard to formulate some excellent ideas for a research project and now is the time to show them off. The audience will assist in the evaluation of the presentations. Each class member will (anonymously) evaluate all of the presentations, using the form on the last page of this syllabus. Attendance to these presentations is very strongly encouraged, and will represent a large portion of your participation grade.

Also, please prepare a one-page handout that summarizes the content of your research effectively and concisely. Make sufficient copies for each member of the class as the information from these handouts will be used in examinations. Please see the attached evaluation guidelines for the criteria that will be used to evaluate the oral presentations and the written work.

SOME EXAMPLES:

<table>
<thead>
<tr>
<th>Failures and Disasters</th>
<th>Three-mile Island; Union Carbide Bhopal Plant; Herald of Free Enterprise; etc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Capabilities</td>
<td>Effects of individual differences (e.g., age, gender, disabilities, etc.) on performance (e.g., driving, work, etc.)</td>
</tr>
<tr>
<td>Designs</td>
<td>Cockpits; Automobiles; Office Space; Labels and warnings; Consumer Products, etc.</td>
</tr>
<tr>
<td>Controls</td>
<td>S-R compatibility; Speed/Accuracy Tradeoffs; HUD's; etc.</td>
</tr>
<tr>
<td>Work Assessments</td>
<td>Work Stations (e.g., cashier, secretary, etc.); Training Programmes, Simulators, etc.</td>
</tr>
</tbody>
</table>
KIN 4V03 – Research Proposal Paper Evaluation

Name: ____________________________________________________

Student Number: __________________________________________

Introduction
a) Review of literature (organized? critically analyzed? current references?) /30
b) The research question (insightful? theoretically significant?) /10
c) Hypotheses (explicitly stated? appropriate?) /5

Method
d) Participants (fully described? appropriate?) /5
e) Task/apparatus (fully described? appropriate for question?) /5
f) Procedures (fully described? logical? easy to replicate?) /5
g) Dependent measures (logical? easy to replicate?) /5

Other
g) Results (appropriate predictions? graphs?) /10
h) References (APA style? complete?) /5
i) Overall writing style/grammar /20

TOTAL /100

FINAL GRADE /35%

(NOTE: Late papers are assessed a penalty of 2% of the final course grade for each day late)
KIN 4V03 – Presentation Evaluation

Name of presenter: ________________________________________

Use the following scale to assign grades:

- Outstanding 8.5 – 10.0
- Very good 7.5 – 8.4
- Average/good 6.5 – 7.4
- Marginal 5.0 – 6.4
- Poor < 4.9

1) **Organization**
Was the information presented in a way that was easy to follow? Was it thought-provoking? Did it make you become more interested in the topic? Were time and/or space managed effectively?

Score = _______ / 10

2) **Presentation**
Was the presenter’s voice clear, confident and enthusiastic? Maintained eye contact? Spoke to audience/questioner (did not just read notes)? Answered questions and delivered information in a way that was easy to understand?

Score = _______ / 10

3) **Visual**
Was the material conveyed used effectively? Were images, figures, etc. used effectively? Too much text? Too little text? Was the overall visual presentation “pleasing”?

Score = _______ / 10

4) **Take-home message**
What will you remember about the presentation? Was it something that the presenter wanted you to remember? Did you learn anything?

Score = _______ / 10

5) **Handout**
Was the important information summarized concisely and effectively? Would the handout make a useful study guide?

Score = _______ / 10

Total = _______ / 50 (worth 10% of final grade)