UNIVERSITY OF NEBRASKA AT OMAHA
COURSE SYLLABUS/DESCRIPTION

Department and Course Number	CSCI 4250
Course Title	Human-Computer Interaction
Course Coordinator	Brian Dorn
Total Credits	3
Date of Last Revision	April 10, 2014

1.0 Course Description

1.1 Overview of content and purpose of the course (Catalog description)
Human-computer interaction is concerned with the joint performance of tasks by humans and machines; human capabilities to use machines (including learnability of interfaces); algorithms and programming of the interface; engineering concerns that arise in designing and building interfaces; the process of specification, design, and implementation of interfaces; and design trade-offs.

1.2 For whom course is intended
Computer Science or Information Systems Engineering majors

1.3 Prerequisites of the course (Courses)
CSCI 4830

1.4 Prerequisites of the course (Topics)
   1.4.1   Basic concepts of Software Engineering
   1.4.2   OOP and C++/Java
   1.4.3   Demonstrated fluency in any visual programming language

1.5 Unusual circumstances of the course
None

2.0 Objectives

2.1 Understand and apply the principles underlying HCI including: visual sensation and perception; limits of human memory, cognition, and learning; ergonomics and physical abilities; and the human as information processor (HIP) model.

2.2 Apply scientific principles of interface design to the critique and evaluation of user interfaces, demonstrating the psychological properties of the user that will interact/affect the usability of the interface

2.3 Understand and apply common user interaction techniques, metaphors, and design patterns to maximize usability

2.4 Design a user interface based on user requirements (e.g., goal/needs analysis, task and functional analysis, etc.).

2.5 Conduct a heuristic evaluation and other rapid inspection techniques on user interfaces.

2.6 Employ feedback from rapid inspection to propose re-designs of user interfaces.

3.0 Content and Organization

Contact hours

3.1 The relationship of user interface design to the science of
     human-computer interaction (1 hour)

3.2 Interface quality and evaluation (usability) (5 hours)
    3.2.1   Measures of user interface quality
    3.2.2   Methods for observation and evaluation

3.3 Interactive system and interface design examples (4 hours)
    3.3.1   Examples such as word processors, spreadsheets, hypertext systems, programming
          environments, ATM's, voice answering systems and mail systems

3.4 Dimensions of interface variability (5 hours)
    3.4.1   Languages, communication and interaction
    3.4.2   Dialogue genre; the role of metaphor
    3.4.3   Dialogue techniques (including windows, menus, icons, etc.)
    3.4.4   User support and assistance, documentation, training

3.5 User-centered design and task analysis (9 hours)
    3.5.1   Software engineering design models, user-centered design, participatory design
    3.5.2   Task analysis
    3.5.3   Prototyping and the iterative design cycle; the evolution of designs
    3.5.4   The role of principles and guidelines
    3.5.5   Examples of designs

3.6 User interface implementation (9 hours)
    3.6.1   Prototyping tools and environments
    3.6.2   Input and output devices
    3.6.3   Ergonomic issues
    3.6.4   Basic results from computer graphics
    3.6.5   Interface modalities: color, sound, etc.
    3.6.6   The role of graphic and industrial design
    3.6.7   Toolkits and interface development environments, e.g., window managers

3.7 Evaluation revisited; learning from HCI research; the role of models (6 hours)
    3.7.1   A deeper look at evaluation (usability)
    3.7.2   Learning from HCI research; applying science to interface design
    3.7.3   Human information processing models and their role

3.8 System and interface design project: presentations and discussion (6 hours)
     (spread throughout term)

4.0 Teaching Methodology

4.1 Methods to be used
Teaching methods will include in-class lectures, hands-on lab exercises, homework involving
interaction design, case studies, demonstrations, and self-directed study (using materials
distributed via the class web site).

4.2 Student role in the course
Students are expected to attend all lectures and labs, participate in class discussions on HCI-
related issues, complete assigned homework, group project(s), and examinations. Students

will additionally be asked to present their ideas on interaction design from the homework assignments.

5.0 Evaluation

5.1 Type of student projects that will be the basis for evaluating student performance, specifying distinction between undergraduate and graduate, if applicable. For Laboratory projects, specify the number of weeks spent on each project).

Evaluations of user interfaces, task analysis of a simple computerized task, design and development of a prototype user interface (group project), and examinations.

5.2 Basis for determining the final grade (Course requirements and grading standards) specifying distinction between undergraduate and graduate, if applicable.

Grades will be based on the quality of the graded products in 5.1 above, examinations, and class participation.

5.3 Grading scale and criteria

Determined by course instructor (typically, 90-100: A, 81-90: B, etc.). The following is one possible grading scale.

Points	Grade
97-100%	A+
93-96%	A
90-92%	A-
87-89%	B+
83-86%	B
80-82%	B-
77-79%	C+
73-76%	C
70-72%	C-
67-69%	D+
63-66%	D
60-62%	D-

6.0 Resource Material

6.1 Textbooks and/or other required readings used in course
    6.1.1   Johnson, J. (2014). <u>Designing with the mind in mind.</u> Morgan Kaufmann.
    6.1.2   Norman, D. (2013). <u>The design of everyday things</u>. Basic Books.

6.2 Other suggested reading materials, if any
    6.2.1   Apple Computer, Inc. (1997). <u>Macintosh Human Interface Guidelines</u>. Reading, MA: Addison-Wesley Publishing Co. (Available on the Web)

6.2.2   Baecker, R. M., Grudin, J., Buxton, W. A. S., & Greenburg, S. (1996). Readings in Human-Computer Interaction: Toward the Year 2000. San Mateo CA.: Morgan Kaufmann Publishers.

6.2.3   Eberts, R.E. (1994). User Interface Design. Englewood Cliffs, NJ: Prentice-Hall.

6.2.4   Hix, D., & Hartson, H.R. (1993). Developing User Interfaces: Ensuring Usability Through Product and Process. New York, New York: John Wiley & Sons, Inc.

6.2.5   Mandel, T. (1997). Elements of User Interface Design. John Wiley & Sons, Inc.

6.2.6   Microsoft Corporation. (1995). The Windows Interface Guidelines for Software Design. Redmond, WA: Microsoft Press. (Available on the Web)

6.2.7   Nielsen, J. (1993). Usability Engineering. Boston, MA: Academic Press.

6.2.8   Schneiderman, B., Plaisant, C. (2004). Designing the User Interface: Strategies for Effective Human-Computer Interaction, 4th Ed. Reading, MA: Addison-Wesley Publishing Co. (OR 6.1.2)

6.2.9   Dix, A., Finlay, J., Abowd, G., Beale, R. (2003). Human-Computer Interaction, 3rd Ed. Prentice Hall.

6.2.10 Soegaard, M & Dam, R.F., editors (2013) The Encyclopedia of Human-Computer Interaction, 2nd ed, open-access educational material available online: http://www.interaction-design.org/books/hci.html

6.3 Other sources of information
Students are directed to search the World Wide Web for relevant articles or case studies.

6.4 Current bibliography of resource for student's information
(See 6.2)

7.0 Computer Science Accreditation Board (CSAB) Category Content (class time in hours)

CSAB Category	Core	Advanced
Data structures	3	5
Computer organization and architecture	10	4
Algorithms and software design	5	8
Concepts of programming languages	5	5

8.0 Oral and Written Communications

Every student is required to submit at least ___1__ written reports (not including exams, tests, quizzes, or commented programs) to typically __10___ pages and to make __1___ oral presentations of typically ___15__ minutes duration. Include only material that is graded for grammar, spelling, style, and so forth, as well as for technical content, completeness, and accuracy.

9.0 Social and Ethical Issues

Universal design and universal accessibility of interfaces will be discussed in detail. This includes aspects of designing and developing interfaces to provide equal access for disabled and disadvantaged user populations. The course also introduces students to professional ethics related to the conduct of evaluation research with human subjects including topics such as informed consent, IRB, and proper handling of human subjects data.

10.0   Theoretical content

Contact hours

    10.1   The relationship of user interface design to the science of
           human-computer interaction   0.5

    10.2   Interface quality and evaluation (usability)   4.0
       10.2.1 Measures of user interface quality
       10.2.2 Methods for observation and evaluation

    10.3   Dimensions of interface variability   5.0
       10.3.1 Languages, communication and interaction
       10.3.2 Dialogue genre; the role of metaphor
       10.3.3 Dialogue techniques (including windows, menus, icons, etc.)
       10.3.4 User support and assistance, documentation, training

    10.4   User-centered design and task analysis   12.0
       10.4.1 Software engineering design models, user-centered design, participatory design
       10.4.2 Task analysis
       10.4.3 Prototyping and the iterative design cycle; the evolution of designs
       10.4.4 The role of principles and guidelines

    10.5   User interface implementation   15.0

11.0   Problem analysis

Students will learn to apply scientific principles of interface design to the evaluation of user interfaces, conduct a heuristic evaluation (usability test) of the student's user interface, and evaluate a number of interfaces, demonstrating the psychological properties of the user that will interact/affect the usability of the interface.

12.0   Solution design

Students will design a user interface based on user requirements (e.g., goal/needs analysis, task and functional analysis, etc.) and employ feedback from usability tests to the re-design of user interfaces.

CHANGE HISTORY

Date	Change	By whom	Comments
11/07/2002	Initial ABET version	Craiger	
06/14/2003	Cleanup	Wileman	
11/20/2008	Course textbooks updated	Siy	
11/20/2008	Insertion of table mapping course objectives to program outcomes	Siy	
11/21/2008	Updated Teaching Methodology section to include student presentation requirements.	Mahoney	
4/10/2014	Updated texts used, course learning objectives to more closely align with current content, and coverage of social/ethical issues in interface design	Dorn	