Human-Computer Interaction
Course Syllabus

Psychology 585B
North Carolina State University
Winter/Spring term, 1994

Instructor	*Class Meetings*	*Office Hours*
Michael S. Wogalter, Ph.D.	Tuesdays	Mondays 6:30-7:00 P.M.
Office: 730 Poe; Lab: 740 Poe	4:10 - 7:00 P.M.	Tuesdays 3:00-4:00 P.M.
Phone: (voice) 515-1726; (fax) 515-1716	205 Poe Hall	Thursdays 12:45 - 1:30 P.M.
Home: (voice & fax) 851-1884		or by appointment
Email: MikeW@NCSUmvs.cc.NCSU.edu		
(or) Wogalter@Poe.Coe.NCSU.edu		

Course Objectives

This course examines the relationships between people and various aspects of computer interfaces. Some of the topics discussed will be documentation, display format issues, input methods, interaction styles, evaluation and measurement techniques, rapid prototyping, and applications of cognitive science to HCI.

The instructor will be not be giving regular lectures. The class will run as a seminar in which the class participates in active discussion. Each student will be assigned three or four sets of readings (depending on the number of students in the course) and will lead the class in discussion of the assigned articles. Leaders will summarize each article for a period of time lasting no more than 7 - 10 minutes, and then lead discussion of classmates' questions.

Readings

All of the readings will be current journal/proceedings/book chapter articles published in the last 3 years. A complete copy of all articles will be available in the Learning Resources Library (Poe 400). Students wishing to use this source should do so within two weeks of the first class meeting.

Course Requirements

Class participation

Because of the nature of the course, i.e., a seminar, your participation in class is essential. You should be prepared to speak up and add to each meeting's discussion. Class participation will be worth 15% of the final course grade. Also, see "Attendance policy" below.

Exams

Two exams will be given. The exams will be based on the assigned readings and in-class discussions. The first and second exam will account for 15% and 20% of the course grade, respectively. The exams will be available on the dates listed on the calendar and must be

turned in by the assigned date. Late exams will be assessed an automatic penalty equal to 25% of the exam grade per day.

You are strongly encouraged to critically read the assigned readings twice: Once before making up questions (discussed below) and again before coming to class. It is recommended that you take handwritten notes (and comments) about the articles as you go through them. Review them before coming to class. Remember to bring the articles for that week to class.

Leader assignments

Students will be responsible for leading discussion of three or four (1/2 meeting) topic sessions. Leaders will summarize the articles, go through the topic/discussion questions, request input from others, comment on answers, and sum up at the end. Visual aids (i.e., overheads and hand-outs) should be used to assist in leaders' presentations. The quality of the presentations and discussion leadership will account for 25% of the final course grade. Leaders are responsible in making sure that the discussion is fruitful and comes to a close 75 minutes after starting the section. There will be a 10-15 minute break between the two sections of each class meeting.

Topic questions

Each person is required to submit at least 1 to 2 discussion questions for each assigned reading for the upcoming session. These questions should deal with aspects of the articles that you do not understand, for clarification, to stimulate discussion, etc. Questions are due by 3:00 P.M. on the Monday before the next session. Leaders should edit and collate the questions in whatever fashion that will facilitate class discussion, and then bring copies to the course meeting for fellow classmates. A copy of each student's original questions should be transferred the instructor. Your questions should be labeled with your name, date and indications of which articles the questions are referring to. Make a separate sheet for each half session, because different group leaders will be using them. The quality and regularity of your questions will be worth 10% towards your final course grade. Late questions or failure to submit questions will result in penalty. The degree of penalty will depend on such things as how late they were submitted, the frequency of the problem, etc.

Written research project

Students are required to complete a written research project on a topic that has the instructor's approval. The project can be focused on any area of scientific merit with respect to HCI. Most students will probably decide to do a written research proposal, but students will be encouraged not only to design a study but also to collect data.   Papers should be word processed in the format directed by the *Human Factors Author's Guide* or the *Publication Manual of the American Psychological Association*. The written report should contain a title page, abstract, review of relevant literature (related to the problem being addressed, purpose of the research (and the reasoning behind it), method (description of the materials and procedure), results (expected or found), discussion/implications of the research, and references. The report should be no longer than 15 double-spaced pages of text (excluding the title page, abstract, references, and supporting figures and tables). This assignment will be worth 15%. The specific project topic must be chosen by the time the first exam is taken.

Attendance Policy

Students will be expected to attend <u>every</u> class meeting. Missing a single class is like missing a week's worth of classes. Student attendance is important because seminar discussions are only as good as the people who attend. Therefore, students should note that 15% of the course grade is allocated to class participation. It is difficult to participate if you are not in class. Additionally, missing three meetings will result in an automatic penalty of 5% subtracted from the final grade. Each additional missed meeting will result in further reductions of 5% from your final grade. Take the necessary precautions to avoid being in the position to miss a class without a really good excuse.

Grading

All students are expected to do and turn in their own work. Academic integrity is expected. Dishonorable behavior will not be tolerated and when necessary will be pursued through the University's judicial channels.

The grading scale is shown below:

A At least 90%   B At least 80%   C At least 70%   F Less than 70%

A summary of the percentage worth of each of the course components follows:

Class participation:	15%
Exams	35%
Leadership of discussion	25%
Weekly questions	10%
Written research project	15%
TOTAL	**100%**

Calendar for Human-Computer Interaction

January 18

Organizational session; Syllabus Description; Assignment of topics and description of procedures.

January 25

•*1st half.   Usability I*

Chapanis, A. (1991). The business case for human factors in informatics (Chapter 3). In B. Shakel, and Richardson, S. J. (Eds.), *Human Factors for Informatics Usability* (pp. 39-71). Cambridge, UK: Cambridge University Press.

Karat, J. (1988). Software Evaluation Methodologies. In M. Helander (Ed.), *Handbook of Human-Computer Interaction* (pp. 891-903). Amsterdam: Elsevier Science Publishers.

Guillemette, R. A. (1991). The Usability Criterion for Designing Information Systems: A Conspectus. In J. M. Carey (Ed.) *Human Factors in Information Systems: An Organizational Perspective* (pp. 65-87). Norwood, NJ: Ablex Publishing.

•*2nd half.   Usability II*

Ohnemus, K. R., and Biers, D. W. (1993). Retrospective Versus Concurrent Thinking-Out-Loud in Usability Testing. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 1127-1131). Santa Monica, CA: Human Factors and Ergonomics Society.

Virzi, R. A., Sorce, J. F., and Herbert L. B. (1993). A Comparison of Three Usability Evaluation Methods: Heuristic, Think-Aloud, and Performance Testing. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 309-313). Santa Monica, CA: Human Factors and Ergonomics Society.

Carey, T. T. (1991). Usability Requirements Model for Procurement Life Cycles. In J. M. Carey (Ed.) *Human Factors in Information Systems: An Organizational Perspective* (pp. 89-104). Norwood, NJ: Ablex Publishing.

February 1

•*1st half.   Usability III*

Arnett, K. P., and Trumbly. J. (1991). Performance Relationship Considerations for User Interface Design. In J. M. Carey (Ed.) *Human Factors in Information Systems: An Organizational Perspective* (pp. 105-116). Norwood, NJ: Ablex Publishing.

Bailey, R. W., Allan, R. W., and Raiello, P. (1992). Usability testing vs. heuristic evaluation: A head-to-head comparison. *Proceedings of the Human Factors Society 36th Annual Meeting* (pp. 409-413). Santa Monica, CA: Human Factors Society.

Bailey, R. W. (1993). Performance vs. Preference. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 282-286). Santa Monica, CA: Human Factors and Ergonomics Society.

•*2nd half.   Usability IV*

Smilowitz, E. D., Darnell, M. J., and Benson A. E. (1993). Are We Overlooking Some Usability Testing Methods? A Comparison of Lab, Beta, and Forum Tests. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 300-303). Santa Monica, CA: Human Factors and Ergonomics Society.

Desurvire, H., and Thomas, J. C. (1993). Enhancing the Performance of Interface Evaluators Using Non-Empirical Usability Methods. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 1132-1136). Santa Monica, CA: Human Factors and Ergonomics Society.

Wilson, J., and Rosenberg, D. (1988) In M. Helander. Rapid Prototyping for User Interface Design. *Handbook of Human-Computer Interaction* (pp. 859-875). Amsterdam: Elsevier Science Publishers.

February 8

•*1st half.   Visual Display Aid: Color*

Merwin, D. H., and Wickens C. D. (1993). Comparison of Eight Color and Gray Scales for Displaying Continuous 2D Data. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 1330-1334). Santa Monica, CA: Human Factors and Ergonomics Society.

Perlman, G., and Swan, J. E. II. (1993). Color Versus Texture Coding to Improve Visual Search Performance. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 343-347). Santa Monica, CA: Human Factors and Ergonomics Society.

Van Orden, K. F., Divita, J., and Shim, M. J. (1993). Redundant Use of Luminance and Flashing with Shape and Color as Highlighting Codes in Symbolic Displays. *Human Factors, 35*, 195-204.

•*2nd half.   Format/Layout of Information*

Bednall, E. S. (1992). The effect of screen format on visual list search. *Ergonomics, 35*, 369-383.

de Bruijn, D., de Mul, S., and van Ostendorp, H. (1992). The influence of screen size and text layout on the study of text. *Behaviour & Information Technology, 11*, 71-78.

February 15

•*1st half.   Screen Design and Pictorial Aid*

Tullis, T. S. (1988). Screen Design. In M. Helander (Ed.), *Handbook of Human-Computer Interaction* (pp. 377-411). Amsterdam: Elsevier Science Publishers.

Loftus. G. R. (1993). A Picture is Worth a Thousand p Values: On the Irrelevance of Hypothesis Testing in the Microcomputer Age. *Behavior Research Methods , Instruments, and Computers, 2,* 250-256.

•*2nd half.   Multi-modal Spatial Display*

Alty. J. L. (1993). Multimedia - What is It and How do we Exploit It? *People and Computers VI* (pp. 31-44). Cambridge: Cambridge University Press.

Arthur, E. J., Hancock, P.A., and Chrysler, S.T. (1993). Spatial Orientation in Real and Virtual Worlds. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 328-332). Santa Monica, CA: Human Factors and Ergonomics Society.

Brelsford, J. W. (1993). Physics Education in a Virtual Environment. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 1286-1290). Santa Monica, CA: Human Factors and Ergonomics Society.

February 22

•*1st half.   Documentation*

Wright, P. (1988). In M. Helander. Issues of Content and Presentation in Document Design. *Handbook of Human-Computer Interaction* (pp. 629-652). Amsterdam: Elsevier Science Publishers.

Lazonder, A. W., and Meij. H. V. D. (1993). The Minimal Manual: Is Less Really More? *International Journal of Man - Machine Studies, 39*, 729-752.

•*2nd half.   Mental workload and problem solving*

Wierwille, W. W., and Eggemeier, F. T. (1993). Recommendations for Mental Workload Measurement in a Test and Evaluation Environment. *Human Factors, 35*, 263-281.

Guerlain, S. A. E. (1993). Factors influencing the cooperative problem-solving of people and computers. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 387-391). Santa Monica, CA: Human Factors and Ergonomics Society.

March 1

•*1st half.   Physical Characteristics*

Lu, H., and Aghazadeh, F. (1993). VDT positions: Effect on performance and comfort. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting*, 397-400). Santa Monica, CA: Human Factors and Ergonomics Society.

Brand J. L., and Judd, K. W. (1993). Angle of Hard Copy and Text-Editing Performance. *Human Factors, 35*, 57-69.

Straub, H. R., and Granaas, M. M. (1993) Task-Specific Preference for Numeric Keypads. *Applied Ergonomics, 24*, 289-290.

•*2nd half.   In put Devices I*

Walker, N. (1993). Spatial and Temporal Characteristics of Rapid Cursor-Positioning Movements with Electromechanical Mice in Human-Computer Interaction. *Human Factors, 35*, 431-458.

Anderson, N. S., Sobiloff, B., and White, P. (1993). A foot operated PC pointer positioning device. *Proceedings of the Human Factros and Ergonomics Society 37th Annual Meeting* (pp. 314-317). Santa Monica, CA: Human Factors and Ergonomics Society.

March 8

•*1st half.   Input Devices II/Disabilities*

Casali, S. P. (1992). Cursor control device use by persons with physical disabilities: Implications for hardware and software design. *Proceedings of the Human Factors Society 36th Annual Meeting* (pp. 311-315). Santa Monica, CA: Human Factors Society.

Casali, S. P., and Chase, J. D. (1993). The Effects of Physical Attributes of Computer Interface Design on Novice and Experienced Performance of Users with Physical Disabilities. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 849-853). Santa Monica, CA: Human Factors and Ergonomics Society.

Schmandt. C. (1993). From Desktop Audio to Mobile Access: Opportunities for Voice in Computing. *Advances in Human-Computer Interaction. Volume 4* (pp. 251-283). Norwood, NJ: Ablex Publishing Corporation.

•*2nd half.   Voice Input/Recognition*

Casali, S. P, Williges, B. H., and Dryden, R. D. (1990). Effects of recognition accuracy and vocabulary size of a speech recognition system on task performance and user acceptance. *Human Factors, 32*, 183-196.

Barry, T. P., and Liggett, K. K. (1992). Enhanced recognition accuracy with the simultaneous use of three automated speech recognition systems. *Proceedings of the Human Factors Society 36th Annual Meeting* (pp. 288-292). Santa Monica, CA: Human Factors Society.

Karl, L. R., Pettey, M., and Shneiderman, B. (1993). Speech Versus Mouse Commands for Word Processing: An Empirical Evaluation. *International Journal of Man-Machine Studies, 39*, 667-687.

March 11 Project Topic Due ; Pick up Exam I (Due back on March 21)

March 15   S P R I N G   B R E A K

March 22

•*1st half.   Icons/Pictorials*

Kacmar, C. J. (1991). An Experimental Comparison of Text and Icon Menu Item Formats. In J. M. Carey (Ed.) *Human Factors in Information Systems: An Organizational Perspective* (pp. 27-40). Norwood, NJ: Ablex Publishing.

Waterworth, J. A., Chignell, M. H., and Zhai, S. M. (1993) From Icons to Interface Models: Designing Hypermedia From the Bottom Up. *International Journal of Man - Machine Studies, 39*, 453-472.

•*2nd half.   Icons and Standards/Guidelines*

Familant, M. E., and Detweiler, M. C. (1993). Iconic Reference: Evolving Perspectives and an Organizing Framework. *International Journal of Man - Machine Studies, 39*, 705-728.

Reed, P. (1993). Human Factors and Ergonomics Society/American National Standards Institute (ANSI/HFES) Software User Interface Standardization: Critical Issues. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 268-271). Santa Monica, CA: Human Factors and Ergonomics Society.

Ogawa, K. (1993). The Role of Design Guidelines in Assisting the Interface Design Task. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 272-276). Santa Monica, CA: Human Factors and Ergonomics Society.

March 29

•*1st half.   Training*

Martin, M. P. (1991). The Dominant Problem of Training Novice Users. In J. M. Carey (Ed.) *Human Factors in Information Systems: An Organizational Perspective* (pp. 293-308). Norwood, NJ: Ablex Publishing.

Rowe, A. L., and Cooke, N. J. (1993). An Approach to Identifying Meaningful Action Patterns in Student-Tutor Interactions. *Proceedings of the Human Factors and Ergonomics Society 37th Annual Meeting* (pp. 1281-1285). Santa Monica, CA: Human Factors and Ergonomics Society.

•*2nd half.   Knowledge Base Systems*

Adelman, L., Cohen, M. S., Bresnick, T. A. Chinnis, J. O., Jr., and Laskey, K. B. (1993). Real-Time Expert System Interfaces, Cognitive Processes, and Task Performance: An Empirical Assessment. *Human Factors, 35*, 243-261.

Grossman, M. (1991). Creating User - Oriented Interactive Systems: A Declarative Knowledge - Base Approach. In J. M. Carey (Ed.) *Human Factors in Information Systems: An Organizational Perspective* (pp. 117--133). Norwood, NJ: Ablex Publishing.

April 5

•*1st half.   Menus*

Halgren, S. L., and Cooke, N. J. (1993). Towards Ecological Validity in Menu Research. *International Journal of Man - Machine Studies, 39*, 51-70.

Tullis, T. S., and Kodimer, M. L. (1992). A comparison of direct-manipulation, selection, and data-entry techniques for reordering fields in a table. *Proceedings of the Human Factors Society 36th Annual Meeting* (pp. 298-302). Santa Monica, CA: Human Factors Society.

•*2nd half. Interaction Aids*

Kirlik. A. (1993). Modeling Strategic Behavior in Human-Automation Interaction: Why and "Aid" Can (and Should) Go Unused. *Human Factors, 35*, 221-242.

Black, A. (1991). On-line Consultation of Definitions and Examples: Implications for the Design of Interactive Dictionaries. *Applied Cognitive Psychology, 5*, 149-166.

April 12

•*1st half. Knowledge Acquisition*

Gordon, S. E., Schmierer, K. A., and Gill, R. T. (1993). Conceptual Graph Analysis: Knowledge Acquisition for Instructional System Design. *Human Factors, 35*. 459-481.

•*2nd half. Personal/Social Variables*

Rosen, L. D., Sears, D. C., and Weil, M. M. (1993). Treating Technophobia: A Longitudinal Evaluation of the Computerphobia Reduction Program. *Computers in Human Behavior, 9*, 27-50.

Carayon, P. (1993). Effect of Electronic Performance Monitoring on Job Design and Worker Stress: Review of the Literature and Conceptual Model. *Human Factors, 35*, 385-395.

April 19

•*1st half. On-line Conferencing*

McCarthy, J. C., Miles, V. C., Monk, A. F., Harrison, M. D., Dix, A. J., and Wright, P. C., (1993). Text-Based On-Line Conferencing: A Conceptual and Empirical Analysis Using a Minimal Prototype. *Human Computer Interaction, 8*, 147-183.

•*2nd half. User Support*

Lee, A. (1992). User Support: Considerations, Features, and Issues. *Advances in Human - Computer Interaction. Volume 3* (pp. 184-228). Norwood, NJ: Ablex Publishing Corporation.

April 26

•*1st half.   Interaction Flow*

Webster, J., Trevino, L. K., and Ryan, L. (1993). The Dimensionality and Correlates of Flow in Human- Computer Interactions. *Computers in Human Behavior, 9*, 411-426.

•*2nd half.   Engineering for Optimal Performance*

Fisher, D. L. (1993). Optimal Performance Engineering: Good, Better, Best. *Human Factors, 35*, 115-139.

May 2 Pick up Exam 2; Due May 7

Notes: