Psychology 710 – Seminar on Human Factors and Aging

Spring Semester, 2006

Thursdays: 3:00-5:45 PM (Rm. 500 – Poe Hall)

INSTRUCTOR: Dr. Chris Mayhorn **EMAIL:** chris_mayhorn@ncsu.edu

OFFICE: Room 728 - Psychology Bldg. **PHONE:** 919-513-4856

OFFICE HOURS: By appointment or Tuesdays/Thursdays 1-2 PM

REQUIRED TEXT: Rogers, W. A. (1997). *Designing for an aging population*, Santa Monica, CA: Human Factors and Ergonomics Society.

ADDITIONAL READINGS: Supplemental readings will be required for specific lectures. These readings will be available in the Learning Resource Library in Poe Hall, Room 400.

COURSE OVERVIEW: This course is designed to explore the phenomena associated with human aging, including the basic physiological and cognitive changes that co-occur as we age. The impact of these changes on the science of human factors and ergonomics will be discussed such that students will develop an understanding of experimental designs utilized in the field. Topics will include the design of medical devices, smart technology, automobile operation, computer skill acquisition, and aviation…..to name but a few!

EXAMS and GRADING:

98-100 is an A+, 90-97 is an A, 88-89 is a B+, 80-87 is a B, 78-79 is a C+, 70-77 is a C, 68-69 is a D+, 60-67 is a D, below 60 is failing.

Coursework will consist of in-class presentations and a research paper. Students will prepare presentations and lead discussions each week on the assigned reading topic. Readings will be taken from the course text as well as from supplemental sources. Reading assignments are to be completed prior to the day the topic is scheduled for class discussion. All students are expected to actively participate in the discussions. Students will also be required to complete a research paper (details described later in the syllabus) that proposes a laboratory or field investigation into an application of aging theory and ergonomics. All research topics must be pre-approved by Dr. Mayhorn.

Activity	% Grade
Discussion Participation	10
Weekly Reports	30
Presentations	30
Research Paper	30

ANTICIPATED COURSE SCHEDULE

DAY	Topic	Presenter (s)	Reading
1/12	Welcome and Introduction	Mayhorn	Ellis, Mayhorn, & Shehab (in press); Howell (1997); Nichols, Rogers, & Fisk (2003)
1/19	Learning and Memory Decision-Making		Craik, (2000); Dror, Katona, & Mungur (1998); Salthouse (1984); Sanfey & Hastie (2000)
1/26	Sensory and Perceptual Functioning		Kline & Scialfa (1997); Rogers Book (pp. 1-5, 11-14); Thornbury & Mistretta (1981)
2/2	Movement Control and Speed of Behavior		Rogers Book (pp.25-29); Vercruyssen (1997); Walker, Philbin, & Fisk (1997)
2/9	Anthropometry and Biomechanics		Kroemer (1997); Rogers, Meyer, Walker, & Fisk (1998); Rogers Book (pp. 40-44; 58-64)
2/16	Language and Communication Individual Differences		Qualls, Harris, & Rogers (2002);Sharit, Czaja, Nair, & Lee (2003); Tun & Wingfield (1997)
2/23	Older Adults and Driving		Ball & Rebok (1994); Ho, Scialfa, Caird, & Graw (2001); McGregor & Chaparro (2005); Rogers Book (pp. 334-343, 368-372
3/2	Aging, Pilot Performance, & Expertise		Morrow & Leirer (1997); Morrow et al. (2003); Morrow, Yesavage, Leirer, & Tinkleberg (1993)
3/9	*Spring Break (No class)*		
3/16	Healthcare and Rehabilitation		Fernie (1997); Gardner-Bonneau (2001); Mykityshyn, Fisk, & Rogers, W. A. (2002)
3/23	Medication Adherence Assistive Devices		Mayhorn, Lanzolla, Wogalter, & Watson (2005); Park & Jones (1997); Wogalter & Vigilante (2003)
3/30	Using Technologies to Aid in the Performance of Home Tasks		Czaja (1997); Mynatt & Rogers (2002); Parker & Sabata (2004)

4/6	Older Adults and Computer Training		Jacko et al. (2004); Mayhorn, Stronge, McLaughlin, & Rogers (2004); Morrell & Echt (1997)
4/13	*Spring Holiday (No class)*		
4/20	Older Workers		Panek (1997); Rogers Book (pp. 208-215, 240-243); Sterns, Sterns, & Hollis(1996) **(Research papers due)**
4/27	Robotic Devices Smart Technology		Engelhardt & Goughler (1997); Kidd et al. (1999); Tran (2004); Tran & Mynatt (2002)
TUES 5/2 (1pm-4pm)	Class Presentations (15 minute talk on research paper topic followed by 3 minute Q & A)	Everybody	----------

PRESENTATION GUIDELINES

1. Every presenter will receive a grade for each presentation. If the guidelines are not followed, deductions will be made from the particular presentation grade.

2. Each presentation should last 1 hour 15 minutes. This time limit will be strictly enforced. If the presentation is substantially longer or shorter than this duration, points will be deducted from the presentation grade.

3. These will be formal presentations that include the use of visual aids, are well organized, and follow basic rules for speaking in front of an audience (e.g., standing, making eye contact, not reading, etc.).

4. The presentation should present the material covered in the readings but should not be cited verbatim. The goal of this exercise is to promote integration of materials and explanation of phenomena.

5. Presentations should conclude with a summary of the information presented and a discussion on how that information is useful to human factors/ergonomics practitioners.

6. The speaker (with minimal assistance from Dr. Mayhorn) should facilitate a 30-45 minute discussion of the material following the presentation. The speaker should be prepared with questions that promote discussion of the material and potential applications.

PARTICIPATION GUIDELINES

1. Participation grades will be assigned on a class-by-class basis.

2. The presenter is responsible for involving the class in the discussion of the material. Not only can this be facilitated through the use of question and answer sessions, but also by interactive

examples/demonstrations and problems/activities that involve the class (BE CREATIVE). The daily presentation grade for the presenter will be based on how well he/she involves the class.

3. Students are responsible for participating in every class. Participation entails reading and understanding the material prior to coming to class, attending class, asking relevant questions of the presenter, and answering questions posed by the presenter.

WEEKLY REPORTS

1. There will be a report due every week at the beginning of class for the ***non-presenting*** students. Reports not turned in at this time will be penalized one letter grade for each 24 hours late.

2. The report should briefly and concisely summarize the major conclusions from the assigned readings for that class. The report should also integrate and synthesize the information in a discussion that describes the utility of the knowledge to human factors practitioners. General statements can be made but should be followed by the appropriate references and examples. Both the summary and the discussion should not exceed 3 pages!

3. Reports should include a reference section that follows APA format (review a style manual if necessary).

Supplemental Readings

Ball, K., & Rebok, G. (1994). Evaluating the driving ability of older adults. The Journal of Applied Gerontology, 13(1), 20-38.

Craik, F.I.M. (2000). Age-related changes in human memory. In D.C. Park & N. Schwartz (Eds.), Cognitive aging: A primer (pp.75-92). Philadelphia, PA: Taylor and Francis.

Czaja, S. J. (1997). Using technologies to aid in the performance of home tasks. In A.D. Fisk & W. A. Rogers (Eds.), Handbook of human factors and the older adult (pp. 311-334). San Diego, CA: Academic Press.

Dror, I. E., Katona, M., Mungur, K. (1998). Age differences in decision-making: To take a risk or not? Gerontology, 44, 67-71.

Ellis, R. D., Mayhorn, C. B., & Shehab, R. L. (in press). Human factors engineering. In J. Birren (Ed.), The Encyclopedia of Gerontology (2nd Ed.).

Engelhardt, K. G., & Goughler, D. H. (1997). Robotic technologies and the older adult. In A.D. Fisk & W. A. Rogers (Eds.), Handbook of human factors and the older adult (pp. 395-413). San Diego, CA: Academic Press.

Fernie, G. (1997). Assistive devices. In A.D. Fisk & W. A. Rogers (Eds.), Handbook of human factors and the older adult (pp. 289-310). San Diego, CA: Academic Press.

Gardner-Bonneau, D. (2001). Designing medical devices for older adults. In W. A. Rogers & A. D. Fisk (Eds.), Human factors interventions for the health care of older adults (pp.221-237). Mahwah, NJ: Erlbaum.

Ho, G., Scialfa, C. T., Caird, J. K., & Graw, T. (2001). Visual search for traffic signs: The effects of clutter, luminance, and age. Human Factors, 43(2), 194-207.

Howell, W. C. (1997). Foreword, perspectives, and prospectives. In A.D. Fisk & W. A.

Rogers (Eds.), Handbook of human factors and the older adult (pp. 1-6). San Diego, CA: Academic Press.

Jacko, J., Emery, V. K., Edwards, P. J., Ashok, M., Barnard, L, Kongnakorn, T., Moloney, K. P., & Sainfort, F. (2004). The effects of multimodal feedback on older adults' task performance given varying levels of computer experience. Behaviour and Information Technology, *23,* 247-264

Kidd, C. D., Orr, R., Abowd, G. D., Atkeson, C. G., Essa, I. A., MacIntyre, B., Mynatt, E., Starner, T. E., & Newstetter, W. (1999). The Aware Home: A living laboratory for ubiquitous computing research. Lecture Notes in Computer Science (1670), 191-198.

Kline, D.W., & Scialfa, C.T. (1997). Sensory and perceptual functioning: Basic research and human factors implications. In A.D. Fisk and W.A. Rogers (Eds.), Handbook of human factors and the older adult (pp. 27-54). San Diego: Academic Press.

Kroemer, K. H. E. (1997). Anthropometry and biomechanics. In A.D. Fisk & W. A. Rogers (Eds.), Handbook of human factors and the older adult (pp. 87-124). San Diego, CA: Academic Press.

Qualls, C. D., Harris, J. L., & Rogers, W. A. (2002). Cognitive-linguistic aging: Considerations for home health care environments. In W. A. Rogers & A. D. Fisk (Eds.), Human factors interventions for the health care of older adults (pp. 47-67). Mahwah, NJ: Lawrence Erlbaum Associates.

Mayhorn, C. B., Lanzolla, V. R., Wogalter, M. S., & Watson, A. M. (2005). Personal digital assistants (PDAs) as medication reminding tools: Exploring age differences in usability. Gerontechnology, 4(3), 128-140.

Mayhorn, C. B., Stronge, A. J., McLaughlin, A. C., & Rogers, W. A. (2004). Older adults, computer training, and the systems approach: A formula for success. Educational Gerontology, *30,* 185-203.

McGregor, L. N., & Chaparro, A. (2005). Visual difficulties reported by low-vision and nonimpaired older adult drivers. Human Factors, 47(3), 469-478.

Morrell, R. W., & Echt, K. V. (1997). Designing written instructions for older adults: Learning to use computers. In A.D. Fisk & W. A. Rogers (Eds.), Handbook of human factors and the older adult (pp. 335-361). San Diego, CA: Academic Press.

Morrow, D. G., & Leirer, V. (1997). Aging, pilot performance, and expertise. In A.D. Fisk & W. A. Rogers (Eds.), Handbook of human factors and the older adult (pp. 199-230). San Diego, CA: Academic Press.

Morrow, D. G., Ridolfo, H. E., Menard, W. E., Sanborn, A., Stine-Morrow, E. A. L., Magnor, C., Herman, L., Teller, T., & Bryant, D. (2003). Environmental support promotes the expertise-based mitigation of age differences on pilot communication tasks. Psychology and Aging, 18(2), 268-284.

Morrow, D. G., Yesavage, J., Leirer, V., & Tinklenberg, J. (1993). Influence of age and practice on piloting tasks. Experimental Aging Research, 19(1), 53-70.

Mykityshyn, A. L., Fisk, A. D., & Rogers, W. A. (2002). Learning to use a home medical device: Mediating age-related differences with training. Human factors, 44(3), 354-364.

Mynatt, E. D., & Rogers, W. A. (2002). Developing technology to support the functional independence of older adults. Ageing International, 27, 24-41.

Nichols, T. A., Rogers, W. A., & Fisk, A .D. (2003). Do you know how old your participants are? Ergonomics in Design, 11(3), 22-26.

Panek, P. E. (1997). The older worker. In A.D. Fisk & W. A. Rogers (Eds.), Handbook of human factors and the older adult (pp. 363-394). San Diego, CA: Academic Press.

Park, D. C., & Jones, T. R. (1997). Medication adherence and aging. In A.D. Fisk & W. A. Rogers (Eds.), Handbook of human factors and the older adult (pp. 257-287). San Diego, CA: Academic Press.

Parker, M. H., & Sabata, D. (2004). Home, safe home: Household and safety assistive technology. In S. Kwon & D. C. Burdick (Eds.), Gerotechnology: Research and Practice in Technology and Aging (pp145-160). New York, NY: Springer.

Rogers, W. A., Meyer, B., Walker, N., & Fisk, A. D. (1998). Functional limitations to daily living tasks in the aged: A focus group analysis. Human Factors, 40(1), 111-125.

Salthouse, T. A. (1984). Effects of age and skill in typing. Journal of Experimental Psychology : General, 113, 345-371.

Sanfey, A. G. & Hastie, R. (2000). Judgment and decision-making across the adult life span: A tutorial review of psychological research. In D.C. Park & N. Schwartz (Eds.), Cognitive aging: A primer(pp.253-273). Philadelphia, PA: Taylor and Francis.

Sharit, J., Czaja, S. J., Nair, S., & Lee, C. C. (2003). Effects of age, speech rate, and environmental support in using telephone voice menu systems. Human Factors, 45(2), 234-251.

Sterns, A. A., Sterns, H. L., & Hollis, L. A. (1996). The productivity and functional limitations of older adult workers. In W. H. Crown (Ed.), Handbook on employment in the elderly(pp.276-303). Westport, CT: Greenwood Press.

Thornbury, J. M., & Mistretta, C. M. (1981). Tactile sensitivity as a function of age. Journal of Gerontology, *36,* 34-39.

Tran, B. Q. (2004). Technologies to facilitate health and independent living in elderly populations. In S. Kwon & D. C. Burdick (Eds.), Gerotechnology: Research and Practice in Technology and Aging (pp161-173). New York, NY: Springer.

Tran, Q. T., & Mynatt, E. D. (2002). What was I cooking? Towards déjà vu display of everyday memory. In Extended Abstracts of the ACM Conference on Human Factors in Computing Systems.

Tun, P. A., & Wingfield, A. Language and communication: Fundamentals of speech communication and language processing in old age. In A.D. Fisk & W. A. Rogers (Eds.), Handbook of human factors and the older adult (pp. 125-149). San Diego, CA: Academic Press.

Walker, N., Philbin, D. A., & Fisk, A. D. (1997). Age-related differences in movement control: Adjusting submovement structure to optimize performance. Journal of Gerontology: Psychological Sciences, 52B, P40 - P52.

Wogalter, M.S., & Vigilante, Jr., W.J. (2003). Effects of label format on knowledge acquisition and perceived readability by younger and older adults. Ergonomics, 46, 327-344.

Vercruyssen, M. (1997). Movement control and speed of behavior. In A.D. Fisk & W. A. Rogers (Eds.), Handbook of human factors and the older adult (pp. 55-86). San Diego, CA: Academic Press.

IMPORTANT: Regardless of when an exam is taken, it will be assumed that a strict honor code applies. During an examination, no one should use any notes or books. No one should seek information from or provide information to another. If, at any other time, you are talking with someone who has not yet taken a particular exam or if you yourself still need to take it, you should conscientiously avoid discussing the examination in any way.

NCSU does not discriminate on the basis of race, color, national origin, religion, sex, age, or disability. With respect to disabilities, Section 504 of the Rehabilitation Act of 1973 provides that: "No otherwise qualified handicapped individual in the United States shall, solely by reason of his or her handicap be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." NCSU abides by these regulations. I, the instructor, will make "reasonable adjustments" to ensure that students with hearing, visual, motor, or learning disabilities can participate as fully as possible and that the academic requirements of the course are administered in a non-discriminatory manner. For further information and/or assistance in arranging special needs, please contact the Office of Disability Services for Students, located in the Student Health Center, 2815 Cates Avenue, Suite 1900 (voice phone: 515-7653; TDD: 515-8830).

Guidelines for Research Paper

In brief.

This is an important project, and you should read these instructions carefully. Your task is to design an experiment to test an interesting topic about human factors and aging. Hopefully, the topic will be inspired by some of the experiments and/or issues that you have heard about or read about in this course. Although you are not expected to conduct the project that you propose, you will write up an experimental design in APA journal format (see the APA style manual) **that is not more than 15 pages in length**. The Introduction explains the hypothesis and justifies it by reference to previous research and by logical argument. The Method section describes the participants, stimuli, design, apparatus, and procedure. The Results section should explain how you would analyze the data and the Discussion section should discuss possible outcomes and their applied implications. All papers must be typed, proofread, and in my hands by the end of class on the date that it is due. Electronic submissions will not be accepted!!!

Detailed Advice.

Pick an idea that can be tested in a simple manner. One tried and true method to design an experiment is to alter an established experiment in an *interesting* way. You read about an experiment that you find interesting or puzzling. For instance, you might think about alternate explanations of the data and determine a way to alter the experimental conditions to test whether the findings are the same or different using these new techniques. You read a few journal articles to see if your idea is feasible. And, voila, there you have it!!! Of course, you still have to convince others that the change you are proposing is interesting, usually by relating your topic to a broader issue in cognition. Early on, it is a good idea to consult with me about your ideas to get feedback and perhaps even relevant references. Your textbook is also a good source of relevant journal articles. In brief, I expect to meet with each of you individually (or in groups of 2-3) toward the middle of the semester.

Introduction.

You should have a clear hypothesis in mind, but you do not want to throw that idea at the reader first. You want to start by summarizing pertinent research on the topic in a broader context. This context should make your experiment look like a natural and interesting thing to do. It should be clear by now that personal justifications ("I thought it would be interesting to ....") are not appropriate. After you have described the context and presented and justified your hypothesis, the next step is to briefly outline how you plan to test your idea. This is the place where you might describe possible confounding variables and how you plan to control for them, but do not go into your procedures in detail because you will do that in the next section.

Method.

This section is subdivided into about four subsections such as: **Participants**, where you describe the number of participants you used in each condition, their demographic characteristics, and how they were recruited; **Design**, where you describe the exact experimental design (i.e., what are your independent and dependent variables), including conditions and manipulations; **Stimuli**, where you describe any materials (e.g., word lists to be studied and how they were constructed) used during data collection; and **Procedure**, where you describe what happened during an experimental session from start to finish,

usually including instructions to participants. Not every experiment will need all of these sections, and some may need additional ones, such as **Equipment**, usually called Apparatus, where you describe the equipment used (e.g., eye tracker, computers, etc.). In principle, the Method section should provide enough information for another researcher to replicate your study.

Results.

Here, you describe the comparisons in your data that are critical for testing your hypothesis. For instance, you might expect your experimental group to outperform your control group on certain measures.

Discussion.

Here you describe the applied implications of your findings, both the predicted and unpredicted ones. What is their meaning, that is, what would they imply about the *ergonomic processes/procedures* under investigation. First, describe specific implications, and then more general ones. Again, relate your work/ideas to other research in the field. How does your work fit into the "big picture" of previous work.

References.

You list, in APA format, the articles and books that you cite in your paper. Typically, magazines such as "Psychology Today", newspapers such as the "Charlotte Observer", and information plucked off the internet are not acceptable sources!!

Please get started early on topics and ideas; it is almost impossible to do this project at the last minute. Remember to get your topic pre-approved by me before you begin.