RESEARCH METHODS IN HUMAN FACTORS
TASK ANALYSIS AND COGNITIVE TASK ANALYSIS
PSYCHOLOGY 645 – SPRING 2007

Instructor:	Chris Monk	**Office Hours:**	Monday 3:15-4:15pm; by appoint.
Phone:	(703) 993-3408	**Class Time:**	Monday 4:30-7:10pm
Email:	cmonk@gmu.edu	**Class Location:**	David King 2073 (Arch Lab Conf. Room)
Office:	2059 David King	**Website:**	http://hfac.gmu.edu/~cmonk/645S07.html

Course Objectives

For the spring 2007 semester, the course will be a project-based, hands-on approach to hierarchical task decomposition, task analysis, cognitive task analysis, cognitive walkthroughs, and protocol analysis. Task analysis techniques allow you to describe the activities (both physical and cognitive) required in the execution of a task. The course will maintain a dual emphasis on task analysis techniques for both the usability lab and advanced cognitive research. Task analyses will be conducted of routine tasks performed with standard office software as well as problem solving tasks performed with experimental software.

This course is designed to develop/strengthen independence in conducting (1) hierarchical task analyses; (2) cognitive task analyses using KLM, GOMS, NGOMSL, and CogTool; (3) protocol analysis, and (4) cognitive walkthroughs. The course is also designed to provide working familiarity with a number of alternative methods of task analysis.

This course will use a combination of lectures, discussion, and individual projects to convey the material to be learned. The detailed schedule of topics and weekly assignments lists the specific approach used for each class meeting.

Texts & Readings

Diaper, D. & Stanton, N. (2004). *The handbook of task analysis for human-computer interaction*. Mahwah, NJ: Lawrence Erlbaum Associates. (required)

Kirwan, B. & Ainsworth, L.K. (Eds.) (1992). A Guide to Task Analysis. London: Taylor & Francis. (recommended – there are plenty of copies around the lab)

Additional articles will be assigned on a weekly basis.

Course Requirements and Grading

There will be no exams in this course. Grades will be based on projects, class participation, and the individual project only. The final exam for this class is scheduled for May 14 and a reading day is scheduled for May 7. Although there is no final exam in the class, I may use either that time or the reading day time as a class period (particularly if we have any snow days during the semester). I will inform the class whether or not we will need to use this date no later than 3 weeks prior to the end of the class. I will discuss potential use of the reading day on the first night of class.

Projects

70% of the grade will be based upon hands-on projects and class discussions of projects assigned to all students. The goal of these projects is to demonstrate mastery of the various analysis techniques. As some of the projects involve software that may be new to you, students are encouraged to work together to master the mechanics of software use (e.g., downloading a file from the web, how Excel works).

However, all analyses (including, task decomposition, methods, NGOMSL statements, etc.) are expected to be the work of one individual. Exceptions to this rule will be announced in class. If you have any uncertainty about where the line between individual vs. group effort is to be drawn while doing your projects, please come and see one of the instructors.

Late projects

All projects are due on the date announced in class by the instructor. As many of the projects will be discussed in class the day they are due or shortly thereafter, no projects will be accepted late. Students desiring an exception to this policy must contact the instructor BEFORE the project is due. Exceptions may be granted on a case-by-case basis.

Lectures/Class Discussions

15% of the grade will be based upon class participation. This is a project-oriented course and substantial in-class time will be devoted to discussions of the current project. Lectures will introduce the various techniques, their strengths and weaknesses, and theoretical foundations. All students are expected to have read all of the week's assigned readings before coming to class and oversee the discussion of an article. Adequate preparation for a class will be demonstrated by both 1 & 2, or 3:

1. Leading a class discussion of all or part of a reading and
2. Explaining a topic to the rest of the class, or
3. Providing a focused and detailed discussion of those aspects of the readings that you found vague or confusing

In addition, there will be online discussion of articles read for the class (using a discussion board or wiki). This discussion will take place BEFORE the class meets. You each will be expected to make at least a comment on each article, read all of the email discussions, and to participate in on-line discussion by responding to points raised by other students.

Individual Project/Presentation

15% of the grade will be based upon a hands-on project and classroom presentation completed by an individual student. The goal of these projects is to increase the breadth of task analysis techniques learned in the class. Each student shall select a task analysis technique (a list of suggested techniques will be provided). For the selected technique, you must do the following:

1. Find source materials describing the technique.
2. Apply the analysis technique to a data set (to be discussed with, and approved by, the instructors)
3. Give a classroom presentation describing the technique and illustrating your presentation with your data set. The description of the technique should include a description of the steps necessary to perform the technique, in what circumstances this technique would be appropriately used, and a discussion of the advantages and disadvantages of using the technique.
4. Submit (a) an electronic copy of your class presentation slides and (b) a short written report in APA format (5-6 pages of text with 1-2 pages of figures or tables as appropriate), and (c) an ANNOTATED bibliography of the sources that you used in completing your project. NOTE: An annotated bibliography means that in addition to listing the sources you used, you include a 1-3 sentence summary of what is contained in that reference so that others know what can be found in that document.

Attendance

This seminar will be discussion-based; therefore attendance is essential. Lack of attendance will affect a student's Class Participation grade. Please let me know in advance if you will miss class, excluding emergencies or unforeseen circumstances.

Electronic Distribution of Course Information and Materials

On-line materials for this class can be accessed through my website:

http://hfac.gmu.edu/~cmonk/645S07.html

Such materials include, but are not limited to, the syllabus, copies of the PowerPoint slides used in class, additional class readings, guidelines/instructions for assignments, and posting location for assignments and class discussions. I may use WebCT or a discussion board.

Honor Code

George Mason University has an Honor Code that each student accepts as a condition of enrollment. This code is consistent with APA's ethical principles for working professionals, and it is important that each student adhere to the Honor Code. For this course, each student will produce his or her own assignments. If you have any questions about what is permitted and what is not, please as me.

Outside sources (e.g., journals, books) will be required to complete some course assignments. Plagiarism is defined as in the APA's "Ethical Principles of Psychologists and Code of Conduct" and in the Publication Manual of the American Psychological Association (see pages 292 – 298 of the Fourth Edition).

Special Accommodations

If you are a student with a disability and you need academic accommodations, please see me and contact the Disability Resource Center (DRC) at 703-993-2474. All academic accommodations must be arranged through that office.

Course Outline

A detailed course schedule will be provided in class and will be available on the class website. Please consult the online schedule

Important Dates

First Day of Class	Jan. 22
Last Day to Add	Feb. 6
Last Day to Drop	Feb. 23
Elective Withdrawal Period	Feb. 24 – Mar. 23
Spring Break	Mar. 11 – 18
Reading Day	May 7
Last class*	May 14 – Finals week: Mon. 4:30 – 7:15pm

* Last class if needed.

Reference Articles

Articles and chapters will be made available electronically.

Cockton, G., Lavery, D. & Woolrych, A. (2003). Inspection-based evaluations. In The Human-Computer Interaction Handbook. J. Jacko & A. Sears (Eds.). New Jersey: Lawrence Erlbaum Associates, 1118-1138. (Paper)

Ericsson, K. A. & Simon, H. A. (1996). Protocol analysis: Verbal reports as data. Cambridge, MA: MIT Press. (Preface and Chapter 6)

Fisher, C., & Sanderson, P. M. (1996 March). Exploratory sequential data analysis: Exploring continuous observational data. interactions, 25-34.

Green, P. (1999). Estimating compliance with the 15-second rule for driver-interface usabilty and safety., Proceedings of the Human Factors and Ergonomics Society 43rd Annual Meeting. Santa Monica, CA: Human Factors and Ergonomics Society. (http://www.umich.edu/~driving/publications/HFES-Green1999.pdf)

John, B. E. (2003). Information processing and skilled behavior. In J. M. Carroll, (Ed.), Toward a multidisciplinary science of human computer interaction. Morgan Kaufman. Pg 55-101.

John, B. E., & Kieras, D. E. (1996a). Using GOMS for user interface design and evaluation: Which technique? ACM Transactions on Computer-Human Interaction, 3(4), 287-319.

John, B. E., & Kieras, D. E. (1996b). The GOMS family of user interface analysis techniques: Comparison and contrast. ACM Transactions on Computer-Human Interaction, 3(4), 320-351.

John, B. E., Vera, A. H., Matessa, M., Freed, M., & Remington, R. (2002) Automating CPM-GOMS. Proceedings of CHI, 2002 (Minneapolis, April 20-25, 2002). ACM, New York.

Kieras, D. E. (1997a). Task analysis and the design of functionality. In A. Tucker (Ed.), The Computer Science and Engineering Handbook (pp. 1401-1423). Boca Raton, FL: CRC Press, Inc.

Kieras, D. (1997b). A guide to GOMS model usability evaluation using NGOMSL. In M. Helander, T. K. Landauer, & P. Prabhu (Eds.), Handbook of Human-Computer Interaction, (Second ed., pp. 733-766). New York: Elsevier.
(http://www.engin.umich.edu/class/eecs493/html/lectures/NGOMSL_Guide.pdf)

Kieras, D. E. (2003). Model-based evaluation. In The Human-Computer Interaction Handbook. J. Jacko & A. Sears (Eds.). New Jersey: Lawrence Erlbaum Associates, 1139-1151.

Kieras, D. E., & Meyer, D. E. (2000). The role of cognitive task analysis in the application of predictive models of human performance. In J. M. Schraagen & S. F. Chipman & V. L. Shalin (Eds.), Cognitive task analysis (pp. 237-260). Mahwah, NJ: Lawrence Erlbaum Associates.

Nowakowski, C., & Green, P. (2001). Prediction of menu selection times parked and while driving using the SAE J2365 method (Technical Report UMTRI-2000-49). Ann Arbor, MI: University of Michigan Transportation Research Institute. (http://www.umich.edu/~driving/publications/UMTRI-2000-49A3.pdf)

Olson, J. S., & Moran, T. P. (1996). Mapping the method muddle: Guidance in using methods for user interface design. In M. Rudisill, C. Lewis, P. G. Polson, & T. D. McKay (Eds.), Human-Computer interface designs: Success stories, emerging methods, and real world context. San Francisco: Morgan Kaufmann Publishers, Increase.

Redish, J. & Wixon, D. (2003). Task analysis. In The Human-Computer Interaction Handbook. J. Jacko & A. Sears (Eds.). New Jersey: Lawrence Erlbaum Associates, 922-940.

Rogers, W. A., Mykityshyn, A. L., Campbell, R. H., & Fisk, A. D. (2001). Analysis of a "simple" medical device. Ergonomics in Design, 9(1), 1-14.

Russo, J. E., Johnson, E. J., & Stephens, D. L. (1989). The validity of verbal protocols. Memory & Cognition, 17(6), 759-769.

Salvucci, D. D. (2003). Predicting the Effects of In-Car Interfaces on Driver Behavior using a Cognitive Architecture. In Proceedings of CHI 2003.

Shepherd, A. (2001). Hierarchical task analysis. New York: Taylor & Francis. (Selected Chapters)

Strayer, D. L., & Johnston, W. A. (2001). Driven to distraction: Dual-task studies of simulated driving and conversing on a cellular telephone. Psychological Science, 12(6), 462-466.

vanSomeren, M. W., Barnard, Y. F., & Sandberg, J. A. C. (1994). The think aloud method: A practical guide to modelling cognitive processes. New York: Academic Press. (Chapter 4)

Wharton, C., Rieman, J., Lewis, C., & Polson, P. (1994). The cognitive walkthrough method: A practitioner's guide. In J. Nielsen & R. L. Mack (Eds.), Usability Inspection Methods, . New York: John Wiley.

Preliminary Schedule of Lectures for PSYC 645

Date	Week	Topic	Subject	Readings
22-Jan	1	Introduction to task analysis & course	Introduction to course & syllabus; Overview of course content; exercise: task analysis of dinner cooking	Chapters 1,2
29-Jan	2	Traditional Task Decomposition	Class report on their task analysis of dinner cooking; Lecture: task decomposition; discussion of readings; assignment of weekly projects; subgoal analysis of dinner?	Chapter 3, Shepherd (Chap 3)
5-Feb	3	Traditional Task Decomposition/HTA	Class exercises	Shepherd (Chap 6)
13-Feb	4	HTA	Class Report; Lecture; Student Report, Assignment HTA #1:	Ericsson & Simon (Preface & Chap 6)
19-Feb	5	Verbal protocol analysis	Student Project Report; Class Report; Lecture; Verbal protocol analysis; Assignment: VPA assignment	Wharton et al, 1994; Chapters 5, 10
26-Feb	6	Cognitive Walkthroughs	Student Project Report; Class Report, Lecture/Class exercise: Cognitive Walkthrough	Chapter 4
5-Mar	7	KLM -- intro to Cognitive Task Analysis	Class Report, Student Project Report; Lecture: Intro to CTA & KLM; KLM #1	Chapters 14, 15
12-Mar		SPRING BREAK		
19-Mar	8	NGOMSL #1	Student Project Report; Class Report, Lecture: intro to NGOMSL; Assignment: NGOMSL #1, ManTel interfaces	Chapter 16
26-Mar	9	NGOMSL #2	Student Project Report; Class Report; Lecture; NGOMSL; Assignment: NGOMSL #2	Chapter 17
2-Apr	10	HTA, Step Analysis, GOMS, Trace	Student Project Report; Class Report; Lecture: None; Assignment: HSGT #1	Chapters 8, 13
9-Apr	11	Practitioner Examples	Sharing of Technique Usage at Internship Sites	Chapter 19
16-Apr	12	Tools for Doing CTA: CogTool	Student Project Report; Lecture: CogTool; Assignment: CogTool	Chapters 18, 26
23-Apr	13	Levels-of-analysis	Student Project Report; Class Report; Lecture; In-class cell phone level of analysis project; Assignment; HSTG #2	Chapters 28, 29, 30
30-Apr	14	Wrapping it up	Comparison of techniques learned	
7-May OR 14-May	15	Make-Up Date/ Presentations		