

INFO 611: Design of Interactive Systems

Winter 2012 online

Professor Gerry Stahl

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Course Description

INFO 611 focuses on methods in common use for the design of interactive systems—covering such topics as interactive design, iterative design, usability analysis, prototyping and evaluation—and the theoretical foundations underlying the design of interactive systems.

When you have completed this course, you should be able to:

- ❖ Apply research literature to interactive-system design.
- ❖ Explain appropriate interactive-system design methods.
- ❖ Apply interactive-system design methods throughout the interactive system development cycle.
- ❖ Apply the results of user/task analysis and evaluation to inform the design.
- ❖ Demonstrate the iterative relationship between design and evaluation methods in interactive-system design.

Interactive systems are socio-technical systems, so their design must be driven by the human and social needs of users and user communities. Accordingly, this course looks at various approaches for studying, analyzing and evaluating system requirements—particularly for cooperative, collaborative and social-computing systems. It reviews approaches based on ethnography, ethnomethodology, work-studies, participatory design, cooperative design, prototyping and design-based research. It stresses human-centered design theories and considers case studies of the design of CSCW and CSCL systems.

This course is designed and organized to support collaborative learning; work in small groups is the primary learning activity; the instructor's role is primarily to structure, assess and guide the experience. The course is organized in online seminar style. Students will prepare presentations on the readings, working in online small groups. Critical, creative, well-grounded perspectives on the readings are encouraged. The course will work toward the writing of research review papers that explore the leading edge of research on the design of interactive systems, such as work-studies, activity theory and design-based research.

The course is a graduate-level seminar course. It requires careful reading of 50-75 pages a week. It requires writing critical reviews of the readings and the composition and refinement of a publishable research review paper. Most communication will take place *asynchronously* in Blackboard, but about one hour per week of *synchronous* collaboration within a small group of students is also required—small groups will be formed based primarily upon when each student can meet online.

This one-time course offering may not be repeated in the future. The content and instructor of this course change each time it is offered. This is an opportunity to discuss the instructor's own perspective on groupware design and research.

Course Readings

The course content is presented by the readings. Students are expected to read all of the readings carefully, take notes and be critical. The reading assignments are listed in the Course Assignments table below. The books that you must purchase are:

- ❖ Crabtree, A. (2003). *Designing Collaborative Systems: A Practical Guide to Ethnography*. New York, NY: Springer.
- ❖ Greenbaum, J. & Kyng, M. (1991). *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: LEA.

These books should be available through the Drexel book store and are on reserve: <http://innoserv.library.drexel.edu/search~S9?rinfo611/rinfo611/1%2C1%2C2%2CB/frameset&FF=rinfo611&2%2C%2C2>. The other readings are available in Blackboard.

- **Reading 1.** Stahl, G., Koschmann, T., & Suthers, D. (2006). Computer-supported collaborative learning: An historical perspective. In R. K. Sawyer (Ed.), *Cambridge Handbook of the Learning Sciences*. (pp. 409-426). Cambridge, UK: Cambridge University Press.
- **Reading 2.** Stahl, G. (2012). A view of computer-supported collaborative-learning research and its lessons for future-generation collaboration systems. *Future Generation Computer Systems*.
- **Reading 3a.** The Design-Based Research Collective (2003). Design-Based Research: An Emerging Paradigm for Educational Inquiry. *Educational Researcher*. 32(1) 5-8; and **Reading 3b.** Dede, C., Nelson, B., Ketelhut, D., Clarke, J., Bowman, C. (2004). Design-based Research Strategies for Studying Situated Learning in a Multi-user Virtual Environment. *Proceedings of the 6th International Conference on the Learning Sciences (ICLS '04)*; and **Reading 3c.** Barab, S. & Squire, K. (2004). Design-Based Research: Putting a Stake in the Ground. *Journal of the Learning Sciences*. 13(1), 1-14.
- **Reading 4.** Nardi, B. (1996). Studying context: A comparison of activity theory, situated action models and distributed cognition. In B. Nardi (Ed.), *Context and consciousness: Activity theory and human-computer interaction*. (pp. 69-101). Cambridge, MA: MIT Press.
- **Reading 5.** Hollan, J., Hutchins, E., & Kirsh, D. (2000). Distributed cognition: Toward a new foundation of human-computer interaction research. *ACM Transactions on Computer-Human Interaction*. 7(2), 174-196.
- **Reading 6.** Greenhow, C., & Belbas, B. (2007). Using activity-oriented design methods to study collaborative knowledge-building in e-learning courses within higher education. *International Journal of Computer-Supported Collaborative Learning*. 2(4), 363-391.
- **Reading 7a.** Crabtree, A. (2003). Preface, Chapter 1.1 “The Motivation of Ethnography in Design” and **Reading 7b.** Chapter 1.2 “A Primary Analytic Point of View for Design: Enter HCI”. In Crabtree, A. (2003). *Designing Collaborative Systems: A Practical Guide to Ethnography*. New York, NY: Springer. Pp. ix-22.
- **Reading 8.** Crabtree, A. (2003). Chapter 1.3. “From Human Factors to Human Actors: Exit HCI”. In Crabtree, A. (2003). *Designing Collaborative Systems: A Practical Guide to Ethnography*. New York, NY: Springer. Pp. 22-33.
- **Reading 9.** Crabtree, A. (2003). Chapter 1.4. “The Turn to the Social”. In Crabtree, A. (2003). *Designing Collaborative Systems: A Practical Guide to Ethnography*. New York, NY: Springer. Pp. 33-42.

- **Reading 10.** Greenbaum, J. & Kyng, M. (1991). Chapter 1: Introduction: Situated Design. In Greenbaum, J. & Kyng, M. (1991). *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: LEA. Pp. 1-24.
- **Reading 11.** Bannon, L. (1991). Chapter 2: From Human Factors to Human Actors: The Role of Psychology and Human-Computer Interaction Studies in System Design. In Greenbaum, J. & Kyng, M. (1991). *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: LEA.
- **Reading 12.** Wynn, E. (1991). Chapter 3: Taking Practice Seriously. In Greenbaum, J. & Kyng, M. (1991). *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: LEA.
- **Reading 13.** Suchman, L. & Trigg, R. (1991). Chapter 4: Understanding Practice: Video as a Medium for Reflection and Design. In Greenbaum, J. & Kyng, M. (1991). *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: LEA.
- **Reading 14.** Andersen, P. & Holmqvist, B. (1991). Chapter 5: Language, Perspectives and Design. In Greenbaum, J. & Kyng, M. (1991). *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: LEA.
- **Reading 15.** Bodker, S. & Pedersen, S. (1991). Chapter 6: Workplace Cultures: Looking at Artifacts, Symbols and Practices. In Greenbaum, J. & Kyng, M. (1991). *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: LEA.
- **Reading 16.** Bodker, S., Greenbaum, J. & Kyng, M. (1991). Chapter 7: Setting the Stage for Design as Action. In Greenbaum, J. & Kyng, M. (1991). *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: LEA.
- **Reading 17.** Kensing, F. & Madsen, K. (1991). Chapter 8: Generating Visions: Future Workshops and Metaphorical Design. In Greenbaum, J. & Kyng, M. (1991). *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: LEA.
- **Reading 18.** Ehn, P. & Sjogren, D. (1991). Chapter 12: From System Descriptions to Scripts for Action. In Greenbaum, J. & Kyng, M. (1991). *Design at Work: Cooperative Design of Computer Systems*. Hillsdale, NJ: LEA.
- **Reading 19.** Stahl, G. (2006) Chapter 5: Collaboration Technology for Communities. In Stahl, G. (2006) *Group Cognition: Computer Support for Building Collaborative Knowledge*. Cambridge, MA : MIT Press. p. 93-118.
- **Reading 20.** Stahl, G. (2006) Chapter 6: Perspectives on Collaborative Learning. In Stahl, G. (2006) *Group Cognition: Computer Support for Building Collaborative Knowledge*. Cambridge, MA: MIT Press. p. 119-154.
- **Reading 21.** Stahl, G. (2006) Chapter 7: Groupware Goes to School. In Stahl, G. (2006) *Group Cognition: Computer Support for Building Collaborative Knowledge*. Cambridge, MA: MIT Press. p. 155-176.
- **Reading 22.** Çakir, M. P., Zemel, A., & Stahl, G. (2009). The joint organization of interaction within a multimodal CSCL medium. *International Journal of Computer-Supported Collaborative Learning*. 4(2), 115-149
- **Reading 23a.** Mühlpfordt, M., & Wessner, M. (2009). The integration of dual-interaction spaces. In G. Stahl (Ed.), *Studying virtual math teams*. (ch. 15, pp. 281-293). New York, NY: Springer; and **Reading 23b.** Stahl, G. (2009). Designing a mix of synchronous and asynchronous media for

VMT. In G. Stahl (Ed.), *Studying virtual math teams*. (ch. 16, pp. 295-310). New York, NY: Springer.

- **Reading 24.** Stahl, G. (2009). Meaning making in VMT. In G. Stahl (Ed.), *Studying virtual math teams*. (ch. 26, pp. 505-527). New York, NY: Springer.
- **Reading 25.** Stahl, G. (2011). How I view learning and thinking in CSCL groups. *Research and Practice in Technology Enhanced Learning (RPTEL)*.
- **Reading 26.** Stahl, G. (2012). Theories of collaborative cognition: Foundations for CSCL and CSCW together. In S. Goggins & I. Jahnke (Eds.), *CSCL@work*. New York, NY: Springer.
- **Reading 27.** Stahl, G. (2010). Group cognition as a foundation for the new science of learning. In M. S. Khine & I. M. Saleh (Eds.), *New science of learning: Cognition, computers and collaboration in education*. (pp. 23-44). New York, NY: Springer.

Course Assignments

<i>Wk</i>	<i>Dates</i>	<i>Readings</i>	<i>Group Review</i>	<i>Comments</i>	<i>Weekly Assignments</i>
1	Jan 9 - 15	Introductions: 1, 2, 3	1, 2, 3		
2	Jan 16 - 22	Theories: 4, 5, 6	4, 5, 6	1, 2, 3	
3	Jan 23 - 29	Theories: 7, 8, 9	7, 8, 9	4, 5, 6	<i>Individual</i> literature review of design of interactive systems
4	Jan 30–Feb 5	Methods: 10, 11, 12	10, 11, 12	7, 8, 9	<i>Group</i> literature review of one specific design approach
5	Feb 6 – 12	Methods: 13, 14, 15	13, 14, 15	10, 11, 12	Abstract of <i>group</i> paper
6	Feb 13 - 19	Methods: 16, 17, 18	16, 17, 18	13, 14, 15	<i>Individual</i> reflection paper
7	Feb 20 - 26	Studies: 19, 20, 21	19, 20, 21	16, 17, 18	Draft of <i>group</i> paper
8	Feb 27–Mar 5	Studies: 22, 23, 24	22, 23, 24	19, 20, 21	<i>Individual</i> feedback on other groups' papers
9	Mar 6 – 12	Conclusions: 25, 26, 27	25, 26, 27	22, 23, 24	<i>Group</i> trial of VMT system
10	Mar 13 - 19			25, 26, 27	Final version of <i>group</i> paper
11					(No exam)

Due dates: All course assignments are due by midnight (East Coast time) on Sunday at the ends of the weeks shown on the table of Course Assignments above.

Course Requirements

READINGS: Read all three of the assigned chapters or papers carefully by the end of the week—do not fall behind the schedule of readings above. Take notes. Think about the main purpose of each reading and its central points. How does it make its argument to support its main points? What terms, concepts, ideas, techniques or arguments are unclear? Is the argument of the reading supported by analysis of data or examples? How could the reading be improved?

GROUP REVIEWS OF READINGS: This assignment is to promote collaborative learning (in your small group) about selected readings. Meet with your group online to draft a review of the one reading assigned to your group. *Do not simply divide the work up, but discuss together what you, as a group, think are the important points for your review.* You might want to each post ideas for the review

to a group asynchronous space in advance of meeting; then meet synchronously for about an hour to discuss how to put the ideas together and to develop them further; then polish the review and agree on it as a group asynchronously; and finally post it to the Blackboard discussion forum by the end of the week listed above for the group review. Be concise and to the point: your group reviews should be 400-500 words long; they should state the main idea or argument of the reading and should point out its value and its limitations; suggest some ways the reading could be improved or its argument could be strengthened. What is the reading trying to accomplish—within its book or within the scientific community; how does its rhetorical and literary style help or hinder this? Do not simply state opinions; back up your claims or arguments with references to the cited data or to the detailed wording. At the top of your reviews (and all group products in the course), list the names of the people who actively participated in writing the review; at the bottom of your reviews (and all group products in the course) indicate where the instructor can find an archive of your synchronous group discussions (e.g., in the Blackboard Group section in a virtual classroom or chat archive or on a chat log uploaded to Blackboard and attached to the review).

INDIVIDUAL COMMENTS ON OTHER GROUPS' REVIEWS OF READINGS: This assignment is to promote collaborative learning (in the whole class) about all the readings. Read the reviews of the two readings that your group did *not* review last week. As an individual, post a comment on each of them of about 100-200 words long to the Blackboard discussion forum of the review by the end of the week. Do not simply agree or disagree with the review; do not simply give your personal opinion or talk about your personal experiences. Be specific and reference the claims you are disputing. Try to deepen the discussion by extending the argument of the reading, the review and other people's comments. Some of the readings are difficult and require background knowledge that not everyone will have; try to fill in some understanding that you think was missing in the other postings.

INDIVIDUAL LITERATURE REVIEW OF DESIGN OF INTERACTIVE SYSTEMS: This assignment is to promote your individual learning about recent developments in the design of interactive systems, since most of the classic papers in the field are more than 20 years old now. As an individual, prepare an annotated literature review of the state of the art of various approaches to the design of interactive systems such as Activity Theory, Design-Based Research, Design Patterns, Participatory Design, Social Informatics, Ethnomethodological Work Studies, Distributed Cognition, etc. Try to cover several active approaches during the past 5-10 years. Include a sentence or two about each paper cited. Post a brief abstract of your review in the discussion forum and attach your review to the abstract by the deadline. Use the course_paper_template from the Blackboard Course Materials to format your paper.

GROUP LITERATURE REVIEW OF ONE SELECTED DESIGN APPROACH: This assignment is to promote collaborative learning (in your group) about recent developments in the design of interactive systems, since most of the classic papers in the field are more than 20 years old now. As a group, select one active approach that you want to study further, such as Activity Theory, Design-Based Research, Design Patterns, Participatory Design, Social Informatics, Ethnomethodological Work Studies, Distributed Cognition, etc. Prepare a more extensive annotated literature review of the state of the art of the selected approach to the design of interactive systems. Try to identify the most important papers published since 2002. Include a couple sentences about each paper cited. Post a brief abstract of your group review in the discussion forum and attach your review to the abstract by the deadline. Use the template to format your paper; include the list of active contributors and a pointer to your synchronous discussion archive.

ABSTRACT OF GROUP PAPER: As a group, propose a research review paper on an approach to the design of interactive systems—probably the approach that you completed the literature review for. Post the abstract of about 200 words by the deadline.

INDIVIDUAL REFLECTION PAPER: As an individual, write a reflection paper on your individual and collaborative learning during the first half of the course and your expectations or desires for the second half. The paper should be 3 to 5 pages long, single-spaced. This paper is confidential between you and the instructor. Post your reflection paper to the Blackboard DropBox by the deadline. Name the file with your last name, e.g., “Stahl_reflection.doc”.

FIRST DRAFT OF GROUP PAPER: As a group, submit a draft of a research review paper of about 5 single-spaced pages, reporting on the state of the art of the approach you selected. Write this as a research review paper that could be submitted to an HCI, CSCW or CSCL conference or journal. What are the main issues that are being debated? What are the main recent findings and what are the big open questions? Follow the instructions and formatting in the template. Use the template to format your paper; include the list of active contributors and the pointer to your synchronous discussion archive. Attach the paper to your abstract by the deadline.

INDIVIDUAL FEEDBACK ON OTHER GROUPS’ PAPERS: As an individual, read the first drafts by the other groups. Post a comment on each of them to the Blackboard discussion forum for the abstracts of the drafts. Your comments should each be about 200-300 words long and should provide specific suggestions on how the authors can improve the paper and strengthen its argument and findings. Support the work of your peers and help them improve their drafts.

GROUP TRIAL OF VMT SOFTWARE: Meet with your group online at an agreed upon time in your assigned VMT chat room. Discuss the mathematical Topic given in the chat room for about an hour. Post a brief group report of your group’s experience using the software. (Further instructions will be provided prior to this assignment.)

FINAL VERSION OF GROUP PAPER: Submit a final version of the research review paper, about 8 pages long. Take carefully into account the suggestions in the reviews by your classmates and by the instructor. Use the template to format your paper; include the list of active contributors and the pointer to your synchronous discussion archive. Attach the final paper to your abstract by midnight of the deadline. The paper must include an Acknowledgments section that includes the following certification: “We individually certify that: To the best of our knowledge, this assignment is entirely work produced by us. Any identification of our group work is accurate. We have not quoted the words of any other person from a printed source or a website without indicating what has been quoted and providing an appropriate citation. We have not submitted any of the material in this document to satisfy the requirements of any other course.”

Course Grading

Grading will be based partially on your individual participation in the course and in your group; partially on the work of you and your group.

Because your class mates will be building on your ideas, it is essential that you post all your assignments on time and that you participate actively in all group activities (both asynchronous and synchronous). Grades will be reduced at least in half for assignments submitted after the deadlines.

Grading is *not* curved: We are trying to build knowledge collaboratively. It is possible for all groups and even all individuals to earn an A in this course. The grading is not competitive, but simply acknowledges the work that you have done on schedule. Most students who take an honest interest in the course and exert reasonable effort in *all* aspects of the course can receive an A. Failure to do your

share in your group work, or to meet deadlines for postings and assignments will lower your grade. Your grade should be a measure of what your group and you have accomplished in this course.

#	points	max			A+	99	100
9	4	36	Group reviews of readings		A	92	98
18	1	18	Comments on group reviews		A-	90	91
2	5	10	Reviews of other groups' papers		B+	88	89
1	12	12	Group final paper		B	82	87
6	4	24	Other assignments		B-	80	81
100					C+	78	79
					C	72	77
					C-	70	71
					D+	68	69
					D	62	67
					D-	60	61
					F	0	59

Generic Information

Problems & Questions. Please raise questions in the class discussion board if possible. This is the best place to raise questions because other students may have the same question and they can benefit from seeing the answer; also, other students can respond with their views on the issue. If it is an urgent or personal problem, email the instructor. If you believe that your group assignment is not going to work out, discuss it with the instructor by email. Email with the instructor is the best medium for confidential concerns, such as concerns about other students in your group or personal events that will interfere with your course work.

No Excuses. No one is interested in excuses. If you need to miss any group activity, notify the instructor and the other members of your group as soon as possible and explain how you will contribute to the group. You are responsible for doing your share of the group work during the term; when you ask others to cover for you, let them know how you will make up for it. Everyone knows that things come up, sometimes unexpectedly, but that does not relieve you of your responsibilities. Your group is your support system in the course – let them know what is going on so they can help you.

Plagiarism. Obviously, plagiarism is not tolerated at Drexel and can result in failure. Plagiarism is passing off someone else's ideas, work or words as your own. Collaboration is encouraged, but always give credit to individuals or groups whose ideas, work or words you are reporting, quoting or summarizing.

Academic Honesty. Cheating, academic misconduct, plagiarism and fabrication are serious breaches of academic integrity and will be dealt with according to University Policy (Section 10 of the Student Handbook.) Students are responsible for their own finished work. Penalties for first offenses

range from 0 on an assignment to an F in the course. All offenses are reported to the University Office of Judicial Affairs.

Late Policy. All individual and group assignments are due online by midnight (East Coast time) of the due date. Group presentations cannot be rescheduled. Grades for late work will be lowered substantially. Due to the collaborative-learning approach, incomplete grades cannot be given.

Student Advisors and Resources. Take advantage of the academic advisors who are available on the third floor of Rush. Appointments with advisors can be scheduled by calling 215-895-2474. Appointments with co-op coordinators can be scheduled by calling 215-895-2185. The Drexel Learning Center is available at <http://www.dlc.drexel.edu>. The Writing Center is available at <http://www.drexel.edu/writingcenter>. The Hagerty Library is available at <http://www.library.drexel.edu>.

Special Needs Students. If you have any special need that must be accommodated, please let the instructor know the first week of class. Contact with the Office of Disability Services (215) 895-2506/7) is strictly confidential.

Privacy Notice

In general, all work and communication in this course should be treated as *public*:

- Your work in this course may be studied by other students in the course.
- Any communication on the Internet may end up being seen by people for whom it was not originally intended.
- The web spaces for this course can be viewed by anyone in the world through the Web.
- ISchool courses may be recorded and streamed for educational purposes. Presentations and other activities in class may be videotaped and made available in the future.
- The instructor and other Drexel faculty, students and staff may have access to anything in Blackboard or the web spaces.
- Future researchers may have access to these materials as data. Although they do not have permission to publish any data about you and although they should ensure anonymity and confidentiality of all personal data, you should assume that activities taking place in this course might be subject to viewing.
- Students in future courses may have access to your work.

Please let the instructor know if you have an objection to your work being made available to others.

Instructor's Background

Hi. My name is Gerry Stahl. I am available every day by email at Gerry.Stahl@drexel.edu. Send me an email if you want to meet with me in person or to inquire about urgent or personal questions.

My professional research area is the field of CSCL (Computer-Supported Collaborative Learning). I think that collaborative learning is an exciting and especially effective way to learn. I believe that there is great potential



to design good computer support for it. I have been experimenting with a number of CSCL prototypes and have written many papers on the theory, design and evaluation of interactive systems to support collaborative learning. We will be taking advantage of what I have learned from my research in this course, and I hope you will benefit from this.

In 2006 I published a book on CSCL entitled *Group Cognition: Computer Support for Building Collaborative Knowledge* and launched the *International Journal of Computer-Supported Collaborative Learning*. In 2009 I published a book on the VMT Project that I direct at the iSchool @ Drexel. I have published over 200 conference papers, journal articles, book chapters and essays. My background is in computer science and philosophy. At Drexel, I teach mainly HCI courses. Before coming to Drexel, I worked at a large research organization in Germany; before that I was a Research Professor at the University of Colorado in Boulder. The 2002 international CSCL conference was at Boulder and I was the Program Chair for it; I have been in charge of workshops at CSCL 2003 in Norway, CSCL 2005 in Taiwan, ICCE 2006 in Beijing, CSCL 2007 in New Brunswick and CSCL 2009 in Greece; I was a Program co-Chair for CSCL 2011 in Hong Kong.

Let me know if you have any questions about my background or check out my home page, where you can see more details and read my papers: <http://GerryStahl.net>. You can download my reflections on “A Career in Informatics” at: <http://GerryStahl.net/personal/career.pdf>.