HUMAN COMPUTER INTERACTION (HCI)

Any experimental courses offered by HCI can be found at:

registrar.iastate.edu/faculty-staff/courses/explistings/ **(**http://www.registrar.iastate.edu/faculty-staff/courses/explistings/**)**

Courses primarily for graduate students, open to qualified undergraduates:

HCI 504: Evaluating Technology-based Learning Environments
(Cross-listed with EDUC). (3-0) Cr. 3. S.
Prereq: EDUC 501
Principles and procedures to plan, design, and conduct effective evaluation studies (formative, summative, usability) in different settings are studied. Opportunities to engage in real or simulated evaluation projects of substantial scope are provided. Create evaluation instruments, develop methods with which to evaluate a product or program, conduct try-outs or usability sessions, analyze the data, report the findings, and recommendations are some of the course activities.

HCI 509: Computer/Video Game Design and Development
(Cross-listed with ARTIS). (0-6) Cr. 3. Repeatable, maximum of 12 credits.
Prereq: Permission of instructor
Independent project based creation and development of "frivolous and non-frivolous" computer games in a cross-disciplinary team. Projects require cross-disciplinary teams. Aspects of Indie development and computer/video game history will be discussed.

HCI 510: Foundations of Game-based Learning
(Cross-listed with EDUC). Cr. 3. S.
Prereq: 12 Graduate Credits
Theories, principles and best practices of utilizing games in educational environments. Topics include the theoretical foundations of learning games and game play, identity development in online environments, and assessment of learning in and out of games.

HCI 515: Statistical Natural Language Processing
(Cross-listed with ENGL, LING). (3-0) Cr. 3.
Prereq: STAT 330 or equivalent, recommended ENGL 219 or LING 219, or ENGL 511 or LING 511
Introduction to computational techniques involving human language and speech in applications such as information retrieval and extraction, automatic text categorization, word prediction, intelligent Web searching, spelling and grammar checking, speech recognition and synthesis, statistical machine translation, n-grams, POS-tagging, word-sense disambiguation, on-line lexicons and thesauri, markup languages, corpus analysis, and Python programming language.

HCI 520: Computational Analysis of English
(Cross-listed with ENGL, LING). (3-0) Cr. 3.
Prereq: ENGL 510 or LING 510, and ENGL 511 or LING 511
Concepts and practices for analysis of English by computer with emphasis on the applications of computational analysis to problems in applied linguistics such as corpus analysis and recognition of learner language in computer-assisted learning and language assessment.

HCI 521: Cognitive Psychology of Human Computer Interaction
(Cross-listed with PSYCH). (3-0) Cr. 3.
Prereq: Graduate classification or instructor approval
Biological, behavioral, perceptual, cognitive and social issues relevant to human computer interactions.

HCI 522: Scientific Methods in Human Computer Interaction
(Cross-listed with PSYCH). (3-0) Cr. 3. Alt. S., offered odd-numbered years.
Prereq: PSYCH 521 and STAT 101 or equivalent
Basics of hypothesis testing, experimental design, analysis and interpretation of data, and the ethical principles of human research as they apply to research in human computer interaction.

HCI 525: Optimization Methods for Complex Designs
(3-0) Cr. 3. F.
Prereq: M E 160, MATH 265
Optimization involves finding the 'best' according to specified criteria. Review of a range of optimization methods from traditional nonlinear to modern evolutionary methods such as Genetic algorithms. Examination of how these methods can be used to solve a wide variety of design problems across disciplines, including mechanical systems design, biomedical device design, biomedical imaging, and interaction with digital medical data. Students will gain knowledge of numerical optimization algorithms and sufficient understanding of the strengths and weaknesses of these algorithms to apply them appropriately in engineering design. Experience includes code writing and off-the-shelf routines. Numerous case-studies of real-world situations in which problems were modeled and solved using advanced optimization techniques.

HCI 571: Augmented Reality
(3-0) Cr. 3.
Prereq: M E 557/CPR E 557/COM S 557, or equivalent computer graphics experience
Fundamental technologies enabling augmented reality (AR) application development. Assessment and integration of the hardware and software systems necessary for AR including, tracking, image processing and rendering. Programming skills in C++ and GPU-based optimization are developed to enable evaluation of interaction devices and modalities afforded by AR.

HCI 574: Computational Implementation and Prototyping in HCI
Cr. 3. S.
Fundamental concepts of software programming and the practical use of the Python programming language. Assignments include user interaction and interface design, information visualization, as well as other computational HCI tools. Intended for graduate students without prior background in software development. Requires programming during class lectures.

HCI 575: Computational Perception
(Cross-listed with COM S, CPR E). (3-0) Cr. 3. S.
Prereq: Graduate standing or permission of instructor
This class covers statistical and algorithmic methods for sensing, recognizing, and interpreting the activities of people by a computer. This semester we will focus on machine perception techniques that facilitate and augment human-computer interaction. The main goal of the class is to introduce computational perception on both theoretical and practical levels. Participation in small groups to design, implement, and evaluate a prototype of a human-computer interaction system that uses one or more of the techniques covered in the lectures.

HCI 580: Virtual Environments, Virtual Worlds, and Application
(Cross-listed with M E). (3-0) Cr. 3. Alt. S., offered even-numbered years.
Prereq: Senior or Graduate status.
A systematic introduction to the underpinnings of Virtual Environments (VE), Virtual Worlds, advanced displays and immersive technologies; and an overview of some of the applications areas particularly virtual engineering.

HCI 585: Developmental Robotics
(Cross-listed with CPR E). (3-0) Cr. 3. Alt. S., offered odd-numbered years.
Prereq: knowledge of C/C++ programming language.
An introduction to the emerging interdisciplinary field of Developmental Robotics, which crosses the boundaries between robotics, artificial intelligence, developmental psychology, and philosophy. The main goal of this field is to create autonomous robots that are more intelligent, more adaptable, and more useful than the robots of today, which can only function in very limited domains and situations.

HCI 587: Models and Theories in Human Computer Interaction
(3-0) Cr. 3.
Survey of the multidisciplinary models and theories that form the foundation of the science of Human Computer Interaction. Application of the scientific method to solve practical problems by using analyses or approaches from the behavioral and social sciences, and information and computer technology.

HCI 589: Design and Ethics
(Cross-listed with ARTGR). (3-0) Cr. 3. F.S.
Prereq: Graduate classification or permission of instructor.
Issues in ethics and decision-making as they relate to technology, design, design research, HCI, and the design industry.

HCI 590: Special Topics
Cr. arr. Repeatable.
Investigation of problems of special interest in human computer interaction.

HCI 591: Seminar in Human Computer Interaction
Cr. 1-3. Repeatable.

HCI 595: Visual Design of HCI
Cr. 3. SS.
Human interaction design as it applies to HCI. Aspects of audience analysis, design methodologies for creating concepts and solutions, techniques of concept prototyping, and the fundamentals of visual design such as color, type, symbolism, and grid structure. Class discussions, tutorials, and hands-on projects.

HCI 596: Emerging Practices in Human-Computer Interaction
Cr. 3. SS.
Prereq: HCI 521
Innovative or newly emerging ideas within the HCI research field or applied industry practice, e.g., based on changing cultures or attitudes, new technologies, and new economic forces.

HCI 598: HCI Design, Implementation and Implications
Cr. 3. F.S.
Prereq: 21 credits in human computer interaction or permission of the instructor
Capstone course in HCI. Through a significant design project, students demonstrate their mastery of core courses in HCI. This course is the final course for students in the HCI Online MS program.

HCI 599: Creative Component
(3-0) Cr. 3.
Creative component for nonthesis option of Master of Science degree. Offered on a satisfactory-fail basis only.

Courses for graduate students:

HCI 603: Advanced Learning Environments Design
(Cross-listed with EDUC). (3-0) Cr. 3. S.
Prereq: EDUC 503
Exploration of advanced aspects of the learning environments design process. Application of analysis, design, development and production, evaluation, implementation, and project management principles. Theory and research in educational technology provides the foundation for design decisions. Focus on current trends in learning environment design and the production and use of educational technology.

HCI 655: Organizational and Social Implications of Human Computer Interaction
(Cross-listed with MIS). (3-0) Cr. 3.
Prereq: Graduate Classification
Examine opportunities and implications of information technologies and human computer interaction on social and organizational systems. Explore ethical and social issues appurtenant to human computer interaction, both from a proscriptive and prescriptive perspective. Develop informed perspective on human computer interaction. Implications on research and development programs.

HCI 681: Cognitive Engineering
(Cross-listed with I E). (3-0) Cr. 3.
Prereq: I E 572 or I E 577 or PSYCH 516 or HCI/PSYCH 521 or equivalent
Provides an overview of human cognitive capabilities and limitations in the design of products, work places, and large systems. Contexts vary broadly and could range from simple use of mobile devices to an air-traffic control or nuclear plant command center. Course focuses on what we can infer about users' thoughts and feelings based on what we can measure about their performance and physiological state. Covers the challenge of designing automated systems.

HCI 697: HCI Internship
Cr. R. Repeatable.
Prereq: Permission of Director of Graduate Education, graduate classification

HCI 699: Research
Cr. arr. Repeatable.