University of Southern California

CSCI 538

Human Performance Engineering

Class Vision Statement:

This course addresses tools and techniques for addressing issues related to Human Performance Engineering (HPE) of computing systems. The graduate Computer Science and Computer Engineering major will gain a strong background on how user computer interaction can affect human operator performance, learning to avoid typical pitfalls to enhance the user experience. Students will understand HPE as it relates to games, immersive environments and other real-time (immediate response) applications. Apply lessons learned in class to project integrated into lectures and discussion.

Pre-requisite: CSCI 521, CSCI 537 (Immersive Environments) or consent of Instructor

Instructor: Steven M. Jacobs

Class Number/Units: 3

Date/Time: 1 evening per week


Class web site: see: https://www.uscden.net/webapps/login/

Grades: Grades determined by 30% midterm, 30% final, 40% class (team) project

Academic Integrity:

Students must work independently on all individual assignments; collaborating on individual assignments is considered cheating and will be penalized accordingly. All USC students are responsible for reading and following the USC Student Conduct Code, which prohibits plagiarism. Some examples of behavior that is not allowed are: copying all or part of someone else’s work (by hand or by looking at others’ files, either secretly or if shown), and submitting it as your own; giving another student in the class a copy of your assignment solution; consulting with another student during an exam; and copying text from published literature without proper attribution. If you have questions about what is allowed, please discuss it with the instructor.

Students who violate University standards of academic integrity are subject to disciplinary sanctions, including failure in the course and suspension from the University. Since dishonesty in any form harms the individual, other students, and the University, policies on academic integrity have been and will be strictly enforced.
Week 1:
- Introduction
  - Course Overview
  - Research Sources

Human Performance Engineering (HPE) Overview
- Life-Cycle
- Relationship to development process
- Definitions
- Examples

Readings:
Wickens, Chapt. 1 (Intro. To Human Factors), pp. 1-17.

Week 2:
- Device Dependence
  - Rules for workstation vs. hand-held technologies vs. immersive environments
  - Guidelines
  - New technologies
  - Examples

Readings:
Wickens, Chapt. 8 (Displays) and Chapt. 9 (Control)

Week 3:
- HPE Requirements
  - Requirements Analysis
  - HPE Goals
  - Human Factors
  - Acceptable performance
  - Research Methods

Readings:
Wickens, Chapt. 2 (Research Methods), pp. 10-29.

Week 4:
- Interface Analysis
  - Task Analysis
  - User Characteristics Analysis
  - Task Allocation to Human vs. Computer
  - (User) Workload Analysis
User Interface Design Model

Work

Readings:
Wickens, Chapt. 10 (Engineering Anthropometry), Chapt. 11 (Biomechanics), Chapt. 12 (Physiology), and Chapt. 13 (Workload), pp. 243-350.

Week 5:
The Senses
  Perception
  Sensing
  Stimuli
  Human Limits and differences
  Sensory Overload
Memory
  Short Term
  Long Term

Readings:
Wickens, Chapt. 4 (Visual Sensory Systems) and Chapt. 5 (Auditory, Tactile & Vestibular Systems), pp. 38-119.

Week 6:
Visual Aspects
  Visual Design
Evaluation methods
  Usability
  Human performance testing

Readings:
Wickens, Chapt. 15 (Human Computer Interaction)

Week 7:
  Midterm

Week 8:
  Tools & techniques

Readings:
Instructor supplied materials.

Week 9:
  Present Class Research Project status report (present class project status to fellow students for comment/critique)

Week 10:
  Individual Research Roundtable (students will conduct research review coordinated to tie in to class vision statement)

Readings:
Instructor supplied materials.

Week 11:
Cognitive processing and performance
  Problem solving
  Decision making
Motivation
  Motivating users for increased performance

Readings:
Wickens, Chapt. 6 (Cognition) & Chapt. 7 (Decision Making)

Week 12:
  HPE and Games

Readings:
Instructor supplied materials.

Week 13:
Special Topics (These topics may be discussed earlier as appropriate)
  WWW issues for HPE
  Visualization
  Immersive environments
  Training simulators
  Collaboration with other Departments, e.g. ISE

Readings:
Instructor supplied materials.

Week 14:
  Prepare for Project Presentations & Semester review

Week 15:
  Project Presentations

Week 16:
  (study day)

Week 17:
  Final examination