

**Course Title: Human Factors Issues in Integrated Media Systems – ISE 571**  
**Spring 2004 -- Wednesdays 10:00am-1:00pm -- Classroom: PHE333**  
**Professor: Albert “Skip” Rizzo, Ph.D., Integrated Media Systems Center**  
**Office hours: Wednesdays, 9-10 am and 1-3 pm in PHE 412**  
**Contact info: 213-740-9819; [arizzo@usc.edu](mailto:arizzo@usc.edu)**

This graduate level course will cover the essentials of Human Factors issues for the design, development, implementation, and evaluation of Integrated Media Systems. The first two thirds of the course will be run in a combination lecture/seminar format with occasional guest speakers who will provide real-life “in the trenches” presentations on the actual development and use of IMS that will be keyed to the lecture material. The last third will be more “hands-on” and will incorporate USC Integrated Media Systems Center investigators presenting (and conducting demos on) their research with advanced IMS technologies that will immediately be followed by a Human Factors Analysis/brainstorming session.

This will not be your typical EE/CS/PSYCH/HCI/HF course. As well, it will not be a fluffy “soft-science” walkthrough either. This course has been designed to promote serious scientific thinking about the challenges that exist when trying to create IMS and information technology applications that humans find both usable and useful! Insight about the human side of the IMS equation is essential from perspectives across all disciplines in this field (i.e., engineering, computer science, psychology, human factors, communications, cinema, etc.). Consequently, the course will provide a setting where students will be challenged to integrate the multi-disciplinary foundations of knowledge required to advance information technology with human abilities, needs and preferences in the forefront. It is expected that this mix of domain specific knowledge will prepare you for future work in an area of science that cries out for well-integrated “crosstalk” between disciplines. While you will be presented with factual lecture information and cutting-edge readings, the emphasis will be on creating a cross-disciplinary context which will foster informed creative thinking to address questions that haven’t even been thought of yet in this emerging field! The course will stretch the limits of your imagination while keeping both of your feet firmly grounded in the scientific foundations needed to advance the future usability and usefulness of IMS!

**Course Requirements: *Two Tests (during the first 2/3’s of the course), Four group project papers and one project proposal paper.***

***NO FINAL EXAM.***

**Readings: *Since no one textbook exists that covers the range of cutting edge IMS topics presented in this course, specific state-of-the-art readings will be emailed out in advance of lectures.***

### **15 Week Syllabus**

***\*\*Note that guest speakers during the first two sections will speak for 30-45 minutes on topics that will serve to illuminate the content areas presented immediately prior in the lecture.***

## **SECTION 1 -- Basic Human Factors Issues**

### **Week 1 January 14<sup>th</sup>**

Introduction to the course, requirements, readings, etc.

Introduction to traditional Human Factors & definitions of terms

Integrated Media Systems (IMS) and overview of disciplines involved in IMS Sciences

Preview of course topics

***Guest Speaker: Ulrich Neumann, Director of IMSC, on “Integrated Media Systems and the Vision of Immersion”***

#### ***Readings for next week:***

1. Meister, D., O’Brien, T.G. & Charlton, S.G. (1996). An Overview of Human Factors Testing and Evaluation. In: O’Brien & Charlton (Eds.). *Handbook of Human Factors Testing and Evaluation*. pp. 3-40.
2. Stephanidis, C. et al. (1998). Toward an Information Society for All: An International Research and Development Agenda. *International Journal of Human-Computer Interaction*. 10(2), pp. 107-134.
3. Gartner Group Hype Cycle (with Homework)
4. Kurzweil’s Life Cycle of Technology

Week 2 **January 21<sup>st</sup>**

Trends for designing with demographics/target markets/scientific zeitgeist in mind.

Technology Lifecycles

Human Factors and the Information Society

The Revolution in the goals of HF and Societal Impact,

Rizzo's ABC's Model of Integrated Media Systems Design (**ACCESS, BANDWIDTH, CONTENT, DELIVERY, EXPERIENCE, FUNCTIONAL, GOALS, HUMANS, JUSTIFICATION, etc.**)

**Guest Speaker: Jarrell Pair, ICT, on "Wearable Computing"**

**Readings for next week:**

1. Najjar, L. J. (1998). Principles of educational multimedia user interface design. *Human Factors*, 40(2), 311-323.
2. "Wearing IT Out: The Growth of the Wireless, Wearable World". by J. Fenn & A. Linden, Gartner Research (SPA-13-2057), April 17, 2001.

Week 3 **January 28<sup>th</sup>** Human Information Processing Part 1

Human Sensation and Perception: assets and limitations

**Guest Speaker: Jerry Mendel, IMSC, on "Fuzzy Logic Decision Making"**

**Readings for next week:**

1. Preece et al., (1994). Perception and Representation/Attention and Memory Constraints. In: *Human Computer Interaction*. Pp. 75-122.
2. Hudlicka, E. & Fellous, J.M. Review of Computational Models of Emotion. Pp. 1-19.
3. "The Invisible Internet" by Ed Zander, Pres. Sun Microsystems
4. Oppenheimer, T. (1997). The Computer Delusion. *The Atlantic Monthly*.
5. **OPTIONAL** Eysenck, M.W. & Keane, M.T. (1992) Theoretical Issues in Perception; Attention and Performance Limitations; Memory: Structure and Process. In: *Cognitive Psychology: A Student's Handbook*. Pp. 77-174.

Week 4 **February 4<sup>th</sup>** Human Information Processing Part 2

Cognitive Processing

Affect/emotion/social issues

**Guest Speaker: Larry Pryor, IMSC, on "Two Cultures: The Growing Divide Between Text and Multimedia Worlds"**

**Readings for next week:**

1. Hix, D., Swan, J.E., Gabbard, J.L., McGee, M., Durbin, J., King, T. (1999). *User-Centered Design and Evaluation of a Real-Time Battlefield Visualization Virtual Environment*. In *The Proceedings of the IEEE VR'99 Conference* (pp. 96-103). Los Alamitos, CA.: IEEE Computer Society.
2. *Assessment of Virtual Ergonomics* -- Jennifer A. Ehrlich and Eugenia M. Kolasinski
3. Ethical And Legal Aspects Of Human Subjects Research In Cyberspace: a report by the American Association for the Advancement of Science. (1999).

## **SECTION 2 – Applying Human Factors Methods with Specific Information Technologies**

Week 5 **February 11<sup>th</sup>** General Human Research Methodology – Part 1

**Test on Section 1 (1hour)**

Ethics in Human Subject Research

General Experimental Design

**Guest speaker: Jerry Isdale on: "Pervasive, adaptable computing systems - from the net servers to desktops to wearables"**

**Readings for next week:**

1. Turk, M. (2002) Gesture Recognition. In Stanney, K. (Ed.) *Handbook of Virtual Environments*. L.A. Earlbaum: New York.
2. Turk, M. & Robertson, G. (2000). Perceptual User Interfaces. *Communications of the ACM*. Vol. 43, No. 3, pp 33-34.
3. Reeves, B. & Nass, C. (2000). Perceptual Bandwidth. *Communications of the ACM*. Vol. 43, No. 3, pp. 65-70.

Week 6 **February 18<sup>th</sup>**

General Human Research Methodology – Part 2  
Issues and Tools for Human Factors Methods  
User Centered Design/Usability Engineering Tools & Evaluation (Heuristic Expert, Formative, and Summative Evaluation, etc.) Ergonomics, Cost/benefit Analysis, etc  
Perceptual User Interfaces, Gestural based HCI, Emotional computing  
**Guest Speaker: Jackie Morie, ICT, on “The Intersection of Art and Computer Technology”**

**Readings for next week:**

1. Isdale, J. (1998). What is Virtual Reality.
2. Stanney, K., Mourant, R. & Kennedy, R. (1998). Human Factors Issues in Virtual Environments: A review of the literature. *Presence: Teleoperators and Virtual Environments*. 7(4). Pp. 327-351.

Week 7 **February 25<sup>th</sup>**

The Basics of Human Computer Interaction presented by: **Mansour Rahimi, ISE, “HCI in the Trenches” (1.5 hours)**  
Integrated Media Systems -- Part 1 (Virtual Environments, Augmented Reality, Telepresence, Display tech, Immersive Audio and Haptics, Concept of Presence in Immersive environments)

**Readings for next week:**

1. Stanney, K. M., Salvendy, G., et al. (1998). Aftereffects and sense of presence in virtual environments: Formulation of a research and development agenda. (Report sponsored by the Life Sciences Division at NASA Headquarters). *International Journal of Human-Computer Interaction*, 10(2) 135-187.
2. Feiner, S. (2002). Augmented Reality: A New Way of Seeing. *Scientific American*, April.
2. Karney, J. (May 1, 2001). Depth Perception: Beyond avatars and “cool stuff” to realistic business models. *Internet Technology: Graphics*.

Week 8 **March 3<sup>rd</sup>**

Integrated Media Systems -- Part 2 (Navigation/interaction, Side effects/”Cybersickness”, Transfer of Training, Avatars, distributed VE’s and colocation issues, etc.)  
**Guest Speaker: Issac Maya, IMSC, “What does industry want from Integrated Media Systems”**

**Readings for next week:**

1. Calvert, S. The Social Impact of Virtual Reality. (2002). In Stanney, K. (Ed.) *Handbook of Virtual Environments*. L.A. Earlbaum: New York.
2. Rizzo, A., Buckwalter, J.G. & van der Zaag, C. (2002). Virtual Environment Applications for Neuropsychological Assessment and Rehabilitation. In Stanney, K. (Ed.) *Handbook of Virtual Environments*. L.A. Earlbaum: New York.

Week 9 **March 10<sup>th</sup>**

Overview and Analysis of Specific Application Areas: Military, Entertainment, Industry, Medical, Education, Training, Mental Health, Disabilities, Telecommunication, Scientific Visualization, Computer Modeling and Simulation, etc. “Killer Apps”, Funding Issues and Strategies, The Future!!!!!!!!!!!!!!  
The Ethics of IMS  
**Guest Speaker: Shrikanth S. Narayanan, IMSC, on “Speech synthesis and voice recognition issues for more usable IMS”.**

**Readings for next week:**

1. Gross D. (2002). Technology Management and User Acceptance of VE Technology. In Stanney, K. (Ed.) *Handbook of Virtual Environments*. L.A. Earlbaum: New York.
2. Davies, R.C. (2002) Applications of Systems Design Using Virtual Environments. In Stanney, K. (Ed.) *Handbook of Virtual Environments*. L.A. Earlbaum: New York. 1079-1100.

**March 17<sup>th</sup> – NO CLASS - SPRING BREAK**

## SECTION 3 – IMSC TECHNOLOGY SHOWCASE/HUMAN FACTORS ANALYSES

*\*\*Note that content from HF Analysis/brainstorming sessions following these presentations will be used to produce a document that will be given to presenters that outlines design, development, and evaluation issues for advancing these technologies with human usability in mind!*

Week 10 **March 24th**

### ***Test on Section 2***

Overview and Analysis of Specific Application Areas: Military, Entertainment, Industry, Medical, Education, Training, Mental Health, Disabilities, Telecommunication, Scientific Visualization, Computer Modeling and Simulation, etc. “Killer Apps”, Funding Issues and Strategies, The Future!!!!!!!!!!!!!!  
The Ethics of IMS

Week 11 **March 31<sup>st</sup>**

Immersive Audio – **Chris Kryiakakis**

The Media Immersion Environment Storage Infrastructure – **Roger Zimmerman**

HF Analysis/brainstorm

Week 12 **April 7<sup>th</sup>**

Virtual Environments for Testing and Training and 360 Panoramic Video – **Skip Rizzo**

Capturing Immersidata/Data Mining/Acquisition and analysis of haptic data – **Cyrus Shahabi**

HF Analysis/brainstorm

Week 13 **April 14<sup>th</sup>**

Computer Vision and Perceptual User Interfaces – **Issac Cohen**

Haptics – **Gaurav Sukhatme**

HF Analysis/brainstorm

Week 14 **April 21<sup>st</sup>**

BioSight – **Wee Ling Wong**

Avatars/Facial Animation/Augmented Reality – **Ulrich Neumann**

HF Analysis/brainstorm

Week 15 **April 28<sup>th</sup> (Tentative) Fieldtrip to Institute for Creative Technologies, Marina del Ray,**

Final Questions and Course Summary

### **Final Project Paper Due: May 5, 2003 at 1pm**

Grading: Test 1	100points (Graded on Curve)
Test 2	100points (Graded on Curve)
4 Project review papers (done in groups)	100points (25 each)
Final Project paper (10 pages)	100points

### **Weekly Paper Guidelines**

*In the final third of the course, we will be seeing two research presentations/demos of IMSC technologies per each class session. In the final hour of the class, the students will be broken into two groups and each group will be responsible for the production of a 3-page technology and human factors review paper. This class time should serve for you to share ideas, commit some to paper, and plan on who will be responsible for doing what in the final write up of the paper. In addition to the actual content challenge for this, the "process" is hoped to be an exercise in the type of "co-operative" effort that is required in a multidisciplinary work or academic environment (as well as in regular old "real-life"). An initial outline for these papers might involve:*

Weekly Project Papers – 3 page summary of one of the Demo'd technologies in terms of:

1. Technology Introductory Description - Definitions, review of previous work leading up to its current status, etc.
2. Judgment as to where in the various Tech lifecycle is it now?

3. Assets and Limitations?
4. Possible applications?
5. What type of user-centered research would be needed to evolve the enabling technology into a useful system or project?
6. How would it affect the societal landscape?
7. Perhaps the ABC model covered in class can serve to guide your analysis?

One paper will be produced via the efforts of all the group members and everyone in the group will get the SAME grade.

**Final Project Paper:**

Pick what you think would be an ultimate IMS application (killer app). It would necessarily integrate two or more underlying “enabling” technologies and should have coverage of the following areas:

1. State and describe the human needs or purpose that the ultimate application would address.
2. What is your targeted user group. What skill, knowledge and previous experience would they have.
3. Design a research program that would lead to your application's ultimate development. (i.e. where does it fit into the technology lifecycle, what are the human assets and limitations that you would need to consider in order to maximize the range of potential users, how would you investigate these issues in terms of research methodologies).
4. Describe the research methodologies that would be involved throughout design, development and implementation phases.
5. Consider all the possible factors that would affect the ultimate use of your application...how would it advance science...how accessible would it be....would it be safe or would it lead to dangerous individual or societal consequences...would it be marketable and could you make money doing this?
6. Conceptualize these issues by using the "ABC" model that was covered during the semester.
7. Ten page limit (not including references)

**Class Participation:**

While not factored objectively into your grade, your success in this course will likely be related to how well you participate with the other students in your group during the last 1/3 of the course. Also, in order to be a useful contributor to your group, your presence in the classes during the first 2/3's of the course would be strongly recommended.

**Academic Integrity Statement:**

The School of Engineering (or the Department of Industrial and Systems Engineering) adheres to the University's policies and procedures governing academic integrity as described in SCampus. Students are expected to be aware of and to observe the academic integrity standards described in SCampus, and to expect those standards to be enforced in this course.

**Disability Policy Statement:**

Any Student requesting academic accommodations based on a disability is required to register with Disability Services and Programs (DSP) each semester. A letter of verification for approved accommodations can be obtained from DSP. Please be sure the letter is delivered to me (or to TA) as early in the semester as possible. DSP is located in STU 301 and is open 8:30 a.m. - 5:00 p.m., Monday through Friday. The phone number for DSP is (213) 740-0776.