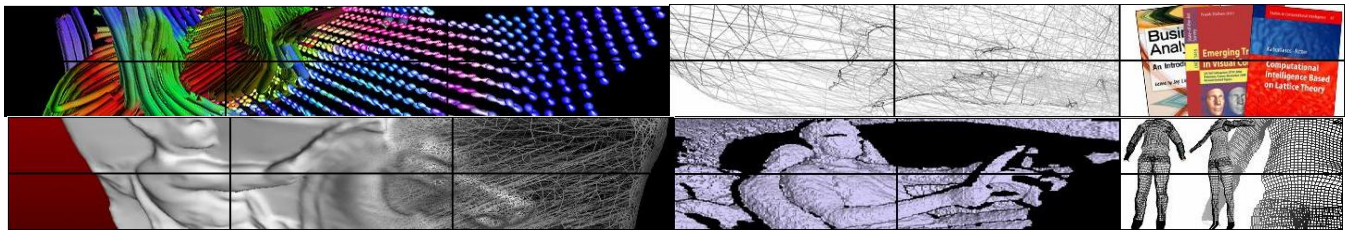
Interdisciplinary Research Seminar: An introduction to research computing



Course Number and Section: DIG6840C - SPRING 2015
Meeting Times and Location: Tuesdays, 7th period, Thursdays 7th-8th periods, CSE E413
Prerequisite: None **Credit Hours:** 3.0
Instructor: Angelos Barmpoutis
Instructor Office Location and Hours: CSE E428, hours to be announced
Instructor Contact Information: angelos@digitalworlds.ufl.edu

Course Description: Interdisciplinary Research Seminar provides diverse presentations, hands-on research projects and interactive experiences that take full advantage of emergent computing technologies. Students will investigate a variety of research computing applications, including virtual environments for rehabilitation, big-data visualization, interactive museums, simulations for automobile safety, systems for computer assisted surgery, and others. The course will also provide an overview of 3D scanning technologies, sensors for natural user interaction, devices for haptic feedback, and will discuss the implications of virtual environments for human interaction, ethics and public policy in the near and long term.

Course Objectives/Goals: During this course the students will be exposed to several funded research projects at the University of Florida in various areas of research computing, including data visualization, medical applications, natural human-computer interaction, digital humanities, automobile safety and others. The students will design their own virtual environments, they will work on processing and visualizing various forms of data, they will learn how to digitize real objects using state-of-the-art 3D scanning tools, they will collect motion data from various human-computer interaction devices (such as Microsoft's Kinect, and Haptic mouse) and use the acquired data in their individual as well as group research projects. As part of their final project the students will have to write a research paper using the standard guidelines and structure followed by popular research computing societies.

Course Outline

Week	Topic
1	Introduction to Virtual Environments
2	Designing 3D Environments
3	Digital Imaging Technologies: From 2D to 3D
4	3D Scanning Techniques
5	Visualizing multi-dimensional spaces
6	Interacting in 3 dimensions, Natural User Interfaces
7	Simulating Real Dynamic Environments
8	Haptic-Devices for Simulation and Interaction
9	Human-Computer Interaction for Computed Assisted Surgery
10	Individual Project Presentations
11	Data Collection and Quantitative Analysis
12	Application: Virtual Environments for Rehabilitation
13	Application: Digital Epigraphy and Archaeology
14	Application: Smart Sensors for Connected Vehicles
15	Group Project Presentations

Grading Scale

Letter Grade	% Equivalency	GPA Equivalency
A	94 – 100%	4.0
A-	90 – 93%	3.67
B+	87 – 89%	3.33
B	84 – 86%	3.00
B-	80 – 83%	2.67
C+	77 – 79%	2.33
C	74 – 76%	2.00
C-	70 – 73%	1.67
D+	67 – 69%	1.33
D	64 – 66%	1.00
D-	60 – 63%	.67
E, I, NG, S-U, WF		0.00

Evaluations and Grades
30% of the final grade comes from Homework Assignments
25% of the final grade comes from Individual Project
10% of the final grade comes from Attendance & Participation
25% of the final grade comes from Group Project
10% of the final grade comes from Research Paper

1) Class Attendance/Demeanor Policy

Policy on Absences

a. At the sole discretion of the instructor, documented Emergencies or medical situations may be the only acceptable reasons for an excused absence. At the very least, students must contact the Instructor 24 hours before class time if they wish to be considered for an excused absence.

b. Unexcused absences will accrue to the detriment of the portion of the final grade given for class participation.

2) OFFICE HOURS and RELATED POLICIES (Making Up Exams or Late Submissions, etc)

Office Hours for Student Consultation

a. The course instructor will post and hold weekly office hours for face-to-face meetings

b. Students are encouraged to begin assignments early enough such that instructors can provide assistance during regularly scheduled office hours if needed

Late policy

a. At the sole discretion of the instructor, late work may be penalized according to the late policy.

b. Any assignment turned in past the due date may lose up to 10% of the total point value of the assignment for each class day it is late.

Policy on Making up Exams

a. At the sole discretion of the instructor, Exams may or may not be taken late. Documented Emergencies or medical situations may be the only accepted reasons for an excused absence on the day of an exam.

b. Any assignment turned in past the due date may lose up to 10% of the total point value of the assignment for each class day it is late.

3) Students with disabilities

Instructor will make every attempt to accommodate students with disabilities. At the same time, anyone requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide you with the necessary documentation, which you must then provide to Instructor when requesting accommodation.

4) Require texts and other materials

The instructor will provide you with several articles as well as useful on-line tutorials and resources.

Suggested Books

Sherman, W.R., Craig, A.B. (2003) *Understanding Virtual Reality.* Morgan Kaufmann

Bowman, D.A., Kruijff, E., Laviola, J.J., Poupyrev, I. (2005) *3D User Interfaces: Theory and Practice.* Addison-Wesley

Earnshaw, R.A., Vince J. (1995) *Computer Graphics: Developments in Virtual Environments.* Academic Press

Begault, D. R. (1994) *3D Sound for virtual reality and multmedia.* Academic Press, London

Durlach, N.I., Mavor, A.S. (1995) *Virtual reality: scientific and technological challenges.* National Academy Press

Stuart, R. (2001) *The Design of Virtual Environments.* Barricade Books

Suggested Articles

Blackwell, M., Morgan, F., DiGioia, A. M. (1998) *Augmented reality and its future in orthopaedics.* Clinical Orthopaedics and Related Research 354, S. 111-122

Bakker, N. H., Werkhoven, P. J., Passenier, P. O. (1999) *The effects of proprioceptive and visual feedback on geographical orientation in virtual environments.* Presence: Teleoperators and Virtual Environments 8, S. 36-53.

Dawson, S. L., Kaufman, J. A. (1998) *The imperative for medical simulation.* Proceedings of the IEEE 86, S. 479-483.

Glantz, K., Durlach, N. I., Barnett, R. C., Walter, A. A. (1997) *Virtual reality (VR) and psychotherapy: opportunities and challenges.* Presence: Teleoperators and Virtual Environments 6, S. 87-105.

Padmos, P., Milders, M. V. (1992) *Quality criteria for simulator images: A literature review.* Human Factors 36, S. 727-748.

Tang, S. L., Kwoh, C.K., Teo, M. Y., Sing, N. W., Ling, K. V. (1998) *Augmented reality systems for medical applications.* IEEE Engineering in Medicine and Biology Magazine 17, S. 49-58.

5) Critical Dates

The final group project presentation will take place during our last class meeting.

6) Academic Honesty

The university's policies regarding academic honesty, the honor code, and student conduct related to the honor code will be strictly enforced. Full information regarding these policies is available at the following links:

- Academic Honesty: http://www.registrar.ufl.edu/catalog/policies/students.html#honesty
- Honor Code: http://www.dso.ufl.edu/sccr/honorcodes/honorcode.php
- Student Conduct: http://www.dso.ufl.edu/sccr/honorcodes/conductcode.php

7) University Counseling Services

Contact information:

Counseling Center
Address:
3190 Radio Rd.
P.O. Box 112662, University of Florida
Gainesville, FL 32611-2662
Phone: 352-392-1575
Web: www.counsel.ufl.edu

8) UF Computer Policy

a. In keeping with the University of Florida's student computer policy http://training.helpdesk.ufl.edu/computing.shtml all assignments completed for this class should be typed using a word processing program. Use of spellchecking and

grammar-checking programs is strongly encouraged. Excessive spelling/grammar errors detract from quality of scholarship, and will be appropriately assessed.

b. Use of desktop publishing software and computer generated graphics for course deliverables that may eventually be included in student's portfolios is also strongly encouraged.

9. EMAIL and Response times

a. All students must maintain and USE their registered Gatorlink email address for email communications related to the class

b. Students will be contacted via their registered Gatorlink email address with any course updates or other items of pertinence to the course.

c. Students are expected to read their Gatorlink email at least once during every business day.

d. Allow a minimum of 24 business hours for the Instructor to reply to email from students.

10. Student Concerns

a. If you have any concerns or questions about any situation in the course please consult the instructor ASAP.

b. If after consultation with the Instructor, the student has unresolved concerns or questions, they may request an appointment with the program director.

SYLLABUS Version 1.0 AB Spring2014