School of Computing and Information Sciences

Course Title: Human-Computer Interaction **Date:** 4/20/16

Course Number: CAP-4104

Number of Credits: 3

Subject Area: Human Computer Interaction	**Subject Area Coordinator:** Christine Lisetti **email:** lisetti@cis.fiu.edu
Catalog Description: HCI foundations, user-cenetered interaction design, prototyping and programming interactive systems, qualitative and quantitative evaluation techniques, designing multimodal interfaces.	
Textbook: • Hartson, R. and Pyla, S. *The UX Book: Process and Guidelines for Ensuring a Quality User Experience.* Morgan Kaufmann, (ISBN: 978-0-12-385241-0), 2012. • Lazar, J. Feng,J.Hochheiser, H. *Research Methods In Human-Computer Interaction*, Wiley, (ISBN : 978-0-470-72337-1), 2010.	
References: • Schneiderman, B. *Designing the User Interface: Strategies for Effective Human-Computer Interaction*, 5th Ed. Pearson New International Edition, 2013. • Alan Dix et al. *Human-Computer Interaction*, 3rd Edition by, Prentice Hall, 2004. • David Benyon, Phil Turner, and Susan Turner, *Designing Interactive Systems: Designing Interactive Systems: A Comprehensive Guide to HCI, UX and Interaction Design*, Addison Wesley, 3rd Ed., 2013. • Johnson, *Designing with the Mind in Mind: Simple Guide to Understanding User Interface Design Rules* 1st Edition. Morgan Kaufmann, 2010.	
Prerequisites Courses: COP-3337 (Programming II)	
Co-requisites Courses: None	

Type: Elective for B.S. major in Computer Science

Prerequisites Topics:

- Basics of perception, cognition, and memory
- Familiarity with programming and program control structures
- Basic concepts of data organization

Course Outcomes:

1. Develop and use a conceptual vocabulary for analyzing human interaction with software in context: affordance, conceptual model, feedback, and so forth.
2. Define a user-centered design process that explicitly takes account of the fact that the user is not like the developer or their acquaintances.
3. Use prototyping techniques to gather, and report, user responses.
4. Use a variety of techniques to evaluate a given UI, and compare the constraints and benefits of different evaluative methods.
5. Design a user study that will yield quantitative results.

6. Conduct a qualitative evaluation and discuss/report the results.
7. Conduct and report on a study that utilizes both qualitative and quantitative evaluation.
8. Discuss the advantages (and disadvantages) of non-mouse interfaces.

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Relationship between Course Outcomes and Program Outcomes

BS in CS: Program Outcomes	Course Outcomes
a) Demonstrate proficiency in the foundation areas of Computer Science including mathematics, discrete structures, logic and the theory of algorithms	
b) Demonstrate proficiency in various areas of Computer Science including data structures and algorithms, concepts of programming languages and computer systems.	
c) Demonstrate proficiency in problem solving and application of software engineering techniques	2,3,4
d) Demonstrate mastery of at least one modern programming language and proficiency in at least one other.	
e) Demonstrate understanding of the social and ethical concerns of the practicing computer scientist.	5,6,7
f) Demonstrate the ability to work cooperatively in teams.	
g) Demonstrate effective communication skills.	

Assessment Plan for the Course & how Data in the Course are used to assess Program Outcomes

Student and Instructor Course Outcome Surveys are administered at the conclusion of each offering, and are evaluated as described in the School's Assessment Plan: http://www.cis.fiu.edu/programs/undergrad/cs/assessment/

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Outline

Topic	Number of Lecture Hours	Outcome
Foundations • Contexts for HCI • User-centered development, e.g., early focus on users, empirical testing, iterative design • Different measures for evaluation • Usability heuristics and the principles of usability testing • Cognitive models, e.g., attention, perception, movement, and memory • Social models that inform interaction design, • Accessibility	4	1,2
Designing Interaction • Principles of graphical user interfaces • Elements of visual design (layout, color, fonts, labeling) • Task analysis • Low-fidelity prototyping • Quantitative evaluation techniques • Help and documentation • Handling human/system failure • User interface standards	4	2, 3, 4, 5
Programming Interactive Systems • Software architecture patterns (e.g. Model-View controller; command objects), • Event management • Presenting information navigation • GUI builders • Data-driven applications	1	1, 2, 3, 8
User Centered Design and Testing • Approaches to the design process • Functionality and usability requirements (cross-reference to SE/Requirements Engineering)	9	2, 3, 4, 5

• Techniques for gathering requirements, e.g., interviews, surveys, ethnographic and contextual enquiry • Techniques and tools for the analysis and presentation of requirements, e.g., reports, personas • Prototyping techniques and tools, e.g., sketching, storyboards, low-fidelity prototyping, wireframes • Evaluation without users, using both qualitative and quantitative techniques, e.g., walkthroughs, GOMS, expert-based analysis, heuristics, guidelines, and standards • Evaluation with users, e.g., observation, think-aloud, interview, survey, experiment • Challenges to effective evaluation, e.g., sampling, generalization • Reporting the results of evaluations		
New Interactive Technologies • Choosing interaction styles and techniques (options, usefulness, acceptance) • Approaches to design, implementation and evaluation of non-mouse interaction	3	1, 8
Statistical Methods for HCI • t-tests • ANOVA • Randomization (non-parametric) testing, within vs. between-subjects design • Calculating effect size • Exploratory data analysis • Presenting statistical data • Combining qualitative and quantitative results	6	4, 5, 6, 7
HCI/Design-Oriented HCI • Consideration of HCI as a design discipline (Sketching , Participatory design) • Critically reflective HCI (Critical technical practice, Philosophy of user experience, Ethnography)	9	1, 2, 4

• Indicative domains of application (Arts-informed computing)		

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Course Outcomes Emphasized in Laboratory Projects / Assignments

	Outcome	Number of Weeks
1	Homework problems addressing user-centered design (Outcome 1, 2)	2
2	Homework problems addressing prototyping and data gathering (Outcome 3)	2
3	Homework problems addressing quantitative evaluation (Outcome 4, 5, 7)	2
	Homework problems addressing qualitative evaluation (Outcome 4, 6, 7)	2
	Homework problems addressing emerging technologies for HCI (Outcome 8)	2

Oral and Written Communication
Some coverage

Social and Ethical Implications of Computing Topics
Some coverage

Approximate number of class credit hours devoted to fundamental CS topics

Topic	Core Hours	Advanced Hours
Algorithms:		
Software Design:	**2.0**	**1.0**
Computer Organization and Architecture:		
Data Structures:		
Concepts of Programming Languages		

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Theoretical Contents

Topic	Class time
Human-Computer Interaction	12

Problem Analysis Experiences

1.	User Centered Design and Testing
2.	Statistical Analysis for HCI

Solution Design Experiences

1.	Innovative Interaction Prototyping
2.	Design-Oriented HCI

The Coverage of Knowledge Units within Computer Science Body of Knowledge[1]

Knowledge Unit	Topic	Type	Lecture Hours
HCI/Foundations	contexts for HCI, user-centered development, evaluation measures, usability heuristics and testing, perception, cognitive models, social models	Core-Tier1	4
HCI/Designing Interaction	principles of graphical user interfaces (GUIs), visual design, task analysis, low-fidelity prototyping, human/system failure, interface standards	Core-Tier2	4
HCI/Programming Interactive Systems	software architecture patterns (e.g. Model-View controller; command objects), event management, presenting information navigation, GUIs, data-driven applications	Elective	1

[1]See https://www.acm.org/education/CS2013-final-report.pdf for a description of Computer Science Knowledge units

HCI/ User-centered Design & Testing	Approaches to design process, usability requirements, techniques for gathering requirements, and for analysis and presentation of requirements, prototyping techniques (e.g., sketching, storyboards, low-fidelity prototyping, wireframes); qualitative and quantitative evaluation techniques w/o users (walkthroughs, GOMS, expert-based analysis, heuristics, guidelines, and standards), evaluation with users (think-aloud, interview, survey, user study); Challenges to evaluation (e.g. sampling, generalization)	Elective	9
HCI/New Interactive Technologies	Approaches to design implementation and evaluation of non-mouse interaction	Elective	3
HCI/Statistical Methods for HCI	Anova, t-tests, randomization (non-parametric) testing, within vs. between-subjects design calculating effect size, exploratory data analysis, presenting statistical data	Elective	6
HCI/Design-Oriented HCI	Sketching, participatory design, domain of applications		9
Total		Elective	36