

# BUS212 Interactive User Interface Design

Outlines

[Instructor Name](#)

KENNEBEC VALLEY COMMUNITY COLLEGE

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## Class 1

1. Introduction both personal and to the class
2. Syllabus review
  - a. Methods to communicate with instructor – Cell Phone 859-0444 Personal email: campbell@countermail.com
  - b. Office Hours – I will be on campus until around 2:00pm every day for the months January and February due to being part of a robotics team. After this time period I will be on campus longer and will notify the class. I am always available by phone, text, and email otherwise.
  - c. Textbook - User Interface Design & Evaluation. Debbie Stone, Caroline Jarrett, Mark Woodroffe, Shailey Minocha. 978- 0120884360
  - d. Course Description, Objectives, and Content
  - e. Grading
  - f. Attendance – attendance will be recorded both in class and using video tracking software for the online students, more on this later.
  - g. Course Requirements
    - i. Assignments – one assignment a week and are usually application based. You have a full week to complete. All assignments are posted online.
    - ii. Exams – There are a few exams during this class and like the assignments will require you to apply the information that you have learned up to that point. They will all be open book because of this. You will have a week for normal exams and two weeks for the final.
    - iii. Project – There is a large project that will extend the entire course. You are tasked with examining a business and planning/designing/evaluating a user interface for a system that is in use/will be used.
    - iv. Other bits and pieces
3. Blackboard demonstration and exploration
4. Lecture capture
  - a. All classes will be recorded and placed online within hours of class.
  - b. When video is ready for viewing an email will be sent out.
  - c. Videos will require the inputting of your email address before viewing. This will allow tracking of your views of the video and will be used for attendance purposes.
  - d. Screen casts will be done for any demonstrations that are made during class and posted in a similar fashion.
5. What is the point of this class?
  - a. When designing systems one of the most overlooked areas is that of the interface with it often being relegated to being one of the last items worked on. This treatment as an afterthought often leads to interfaces that are not useful in fulfilling their tasks and hinder users. Since the interface is what the users actually interface with and is primarily what they know it is important to think of the interface and develop it alongside the rest of the system.
6. Why you should be excited.
  - a. We use interfaces in some manner everyday so most have an innate sense of what they find to be good and bad. The task is to then apply this with some further knowledge to design functional UI.
  - b. This class will allow you to further apply many of the analysis and design concepts started in BUS205, with the focus being on the user interface.

- c. You will learn how to apply design concepts to this system. This will not only allow you to great functional systems but also these skills can be applied in further areas throughout your life.
- d. Good looking UI is not all that we need to be concerned with we also have to think on how the users will interact with the system. In this class we will learn various methods on how interaction can take place.
- e. Today we as users have so many different options of devices to use to interface with systems, these can include items such as smartphones, tablets, and laptops. Each device has its challenges and has to be thought of while in design.
- f. As previously stated we have some idea of what we consider a good and bad interface. However, when it comes to evaluating these sites we need to further our skills so that we can develop effective interfaces.
- g. The final section focuses on persuasion and gives you tools to sway support for user interface design within a company and explain why these topics are integral to the building of systems.

## Class 2

1. Assignment 1
2. Why the user interface matters
  - a. Human Computer Interaction
  - b. User Interface
3. Computers are ubiquitous
4. The importance of good user interface design
  - a. Tangible benefits
  - b. Seamless
  - c. Usability
    - i. ISO 9241
      1. Effectiveness
      2. Efficiency
      3. Satisfaction
      4. Context
5. The problems of poor or bad user interface
  - a. User frustration and dissatisfaction
  - b. Loss of Productivity, efficiency, and money
  - c. Safety and the user interface
  - d. Elections and the user interface
  - e. Small irritations
6. Designing for users
  - a. Usable but not useful
  - b. User centered design
  - c. ISO 13407
  - d. The classic life cycle
  - e. Iterative design
7. Involving users
  - a. Who are the users
    - i. Perspectives
  - b. When and how to involve users
    - i. Early in the design process
    - ii. During prototyping
    - iii. Just before delivery
    - iv. During training/after deliver of the system
8. Evaluation

## Class 3

1. Designing for users
  - a. Usable but not useful
  - b. User centered design
  - c. ISO 13407
    - i. Human centered design principles
      - i. The active involvement of users
      - ii. An appropriate allocation of function between user and system
      - iii. The iteration of design solutions
      - iv. Multidisciplinary design teams
    - ii. Human centered design activities
      - i. Understand and specify the context of use
      - ii. Specify the user and organizational requirements
      - iii. Produce design solutions(prototypes)
      - iv. Evaluate designs with users against requirements
  - d. The classic life cycle
    - i. Waterfall
  - e. Iterative design
2. Involving users
  - a. Who are the users
    - i. Customers
    - ii. Other people within organization
    - iii. Users or end users
    - iv. Perspectives
  - b. Making the design process iterative
    - i. Star life cycle
  - c. When and how to involve users
    - i. Early in the design process
    - ii. During prototyping
    - iii. Just before delivery
    - iv. During training/after deliver of the system
3. Two types of knowledge needed for UI design
  - a. Information Gather Activities and analyses that form part of the user interface design and development process
  - b. User interface design knowledge - for example design principles and design rules
4. Evaluation
  - a. Forms of evaluation
    - i. Diagnostic - looking for problems
    - ii. Measurement - judge the performance
  - b. Stages of evaluation
    - i. Evaluation early in the life cycle
      - i. Validate user requirements
      - ii. Predict usability
      - iii. Assess how the interface meets the users needs
    - ii. Evaluation later in the life cycle
      - i. Continue to judge if the interface meets the users needs
      - ii. Usability

- iii. Create content for future revisions
  - c. How to evaluate
    - i. Observing the organization and how people work
    - ii. Interviewing, Talking, and asking questions
    - iii. Making predictions
- 5. Where we go next

## Class 4

1. Requirements gathering
2. Observing your users
  - a. Direct Observation
    - i. Styles
      1. Field Studies
      2. Controlled Studies
    - ii. Limitations/Problems
      1. Single Pass
      2. Classifying what is important
      3. Obtrusive
      4. Can effect user actions
    - iii. Example scenario pg 30
  - b. Indirect observation
    - i. Styles
      1. Video
      2. Action recording
    - ii. Limitations/Problems
      1. Adds more analysis
      2. Again is obtrusive
      3. Logistics of the recording
    - iii. Example Scenario pg 32
3. Interviewing your users
  - a. Styles
    - i. Structured
    - ii. Unstructured/Flexible
  - b. Important areas
    - i. Making the interviewee comfortable
    - ii. Deciding on level of structure
    - iii. Developing good questions that are not leading
    - iv. Recording
  - c. Testing
4. Questionnaires and surveys
  - a. Types of questions
    - i. Closed
      1. Rating Scales
      2. Semantic differential
      3. Likert Scale
    - ii. Open
      1. What do you...
      2. How do you...
      3. What ways...
  - b. Important areas
    - i. Make process easy for the user. Simple and short.
    - ii. Clear unambiguous questions
    - iii. Ensure the questions are asking what you need to know
    - iv. Provide some extra input such as comment box

- c. Testing
- d. Statistics connection

## Class 5

1. Finding out about the users
  - a. Traditional focus
  - b. Methods that can be used
    - i. Observe users
    - ii. Observe and talk to real users
    - iii. Observe, talk to , and involve
  - c. Areas of investigation
    - i. The domain
    - ii. The users
    - iii. Characteristics of the users
    - iv. Characteristics of the tasks
    - v. Physical Environment
    - vi. Social Environment
    - vii. Organizational Environment
    - viii. User Support Environment
    - ix. Qualitative usability aspects
    - x. Quantitative usability goals
    - xi. Constraints
    - xii. Trade-offs
2. Finding who they are
  - a. Types of users
    - i. Primary users
    - ii. Secondary users
    - iii. Stakeholders
  - b. User characteristics
    - i. Age
    - ii. Sex
    - iii. Culture
    - iv. Physical abilities and disabilities
    - v. Educational Background
    - vi. Computer/IT Experience
    - vii. Motivation
    - viii. Attitude
  - c. Users with physical limitations
    - i. Problems with data
      1. Conceptual
      2. Measurement
    - ii. Results - 15-35%
      1. Blind or visually impaired 1.5 million
      2. Color blindness
        - a. Deuteranopia
        - b. Protanopia
        - c. Tritanopia
3. Describing your users and their characteristics
  - a. Interview/questionnaires
  - b. Breaking into groups

- c. Observation
  - d. Analyze
- 4. Personas
  - a. Assumptions
- 5. Other Stakeholders
- 6. Finding out what the user wants
  - a. Felt needs
  - b. Expressed needs
  - c. Normative need
- 7. The Domain
  - a. Experts - Tacit knowledge
  - b. Uncooperative
  - c. Domain models

## Class 6

1. Describing your users and their characteristics
  - a. Interview/questionnaires
  - b. Breaking into groups
  - c. Observation
  - d. Analyze
2. Personas
  - a. Assumptions
3. Other Stakeholders
4. Finding out what the user wants
  - a. Felt needs
  - b. Expressed needs
  - c. Normative need
5. The Domain
  - a. Experts - Tacit knowledge
  - b. Uncooperative
  - c. Domain models

## Class 7

1. The Domain
  - a. Experts - Tacit knowledge
  - b. Uncooperative
  - c. Domain models

### Chapter 4

1. Task Analysis
  - a. Goals
  - b. Tasks
  - c. Action
2. Task characteristics
3. Task Sequences
4. Task Analysis
  - a. Workflow Analysis
  - b. Job Analysis
5. Problems and difficulties with the current UI
  - a. Work arounds
  - b. Artifacts
6. Techniques
  - a. Describe the steps required to complete a task
    - a. What is to be done
  - b. Capture a representation of the knowledge that people have or need
    - a. How a task is done
7. How to do it
  - a. A task scenario
  - b. A concrete use case
  - c. Essential use case
  - d. Use scenario
8. Cognitive task analysis
  - a. Cognitive walkthrough
9. Mental models
  - a. Users model
  - b. Characteristics
  - c. Structural models
  - d. Functional models
10. Environmental considerations
  - a. Examples
  - b. Physical
  - c. Safety
  - d. Social
  - e. Organizational
  - f. User Support
  - g. How design is affected

## Class 8

1. Techniques
  - a. Describe the steps required to complete a task
    - a. What is to be done
  - b. Capture a representation of the knowledge that people have or need
    - a. How a task is done?
2. How to do it
  - a. A task scenario
  - b. A concrete use case
  - c. Essential use case
  - d. Use scenario
3. Cognitive task analysis
  - a. Cognitive walkthrough
4. Mental models
  - a. Users model
  - b. Characteristics
  - c. Structural models
  - d. Functional models
5. Environmental considerations
  - a. Examples
  - b. Physical
  - c. Safety
  - d. Social
  - e. Organizational
  - f. User Support
  - g. How design is affected

## Class 9

1. Environmental considerations
  - a. Examples
  - b. Physical
  - c. Safety
  - d. Social
  - e. Organizational
  - f. User Support
  - g. How design is affected

### Chapter 5

1. Two Types of knowledge
  - a. Information Gathering
  - b. User Interface design knowledge
2. User interface design knowledge
  - a. Design principles - guides
  - b. Design rules - instructions
3. Four Psychological principles
  - a. Users see what they expect to see
  - b. Users have difficulty focusing on more than one activity at a time
  - c. It is easier to perceive a structured layout
  - d. It is easier to recognize something than to recall it
4. Users see what they expect to see
  - a. Context
  - b. Principle of consistency
  - c. Principle of exploiting prior knowledge
5. Focusing on more than one activity at a time
  - a. Cocktail party effect
    - a. Perceptual Organization
    - b. Principle of importance
6. Structured layout
  - a. Gestalt psychology
    - a. Law of proximity
    - b. Law of similarity
    - c. Law of closure
    - d. Law of continuity
    - e. Law of symmetry
  - b. Figure - ground segregation
    - a. Banner blindness
7. Recognize rather than recall
  - a. Knowledge in the head
  - b. Knowledge in the world
  - c. Principle of recognition

## Class 10

### Chapter 5

1. Two Types of knowledge
  - a. Information Gathering
  - b. User Interface design knowledge
2. User interface design knowledge
  - a. Design principles - guides
  - b. Design rules - instructions
3. Four Psychological principles
  - a. Users see what they expect to see
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  - b. Figure - ground segregation
    - a. Banner blindness
7. Recognize rather than recall
  - a. Knowledge in the head
  - b. Knowledge in the world
  - c. Principle of recognition

## Class 11

1. Assignment Review
2. Structured layout
  - a. Gestalt psychology
    - a. Law of proximity
    - b. Law of similarity
    - c. Law of closure
    - d. Law of continuity
    - e. Law of symmetry
  - b. Figure - ground segregation
    - a. Banner blindness
3. Recognize rather than recall
  - a. Knowledge in the head
  - b. Knowledge in the world
  - c. Principle of recognition
4. Principles from experience
  - a. Visibility - it should be obvious what a control is used for
  - b. Affordance - it should be obvious how a control is used
  - c. Feedback - it should be obvious when a control has been used
5. Connection between design principles and rules

## Chapter 6

1. Requirements
  - a. Usability
    - a. Qualitative - desired usability goals
    - b. Quantitative - specific measures
  - c. Concepts
    - i. Learnability
    - ii. Throughput
    - iii. Flexibility
    - iv. Attitude
    - v. 22 Criteria

## Class 12

### 1. Requirements

#### a. Usability

- a. Qualitative - desired usability goals
- b. Quantitative - specific measures
- c. Concepts
  - i. Learnability
  - ii. Throughput
  - iii. Flexibility
  - iv. Attitude
  - v. 22 Criteria
  - vi. ISO 9241
  - vii. ISO 13407

#### b. Modern Day view of visibility

- a. Contrast with original views
- b. The five E's
  - i. Effective
  - ii. Efficient
  - iii. Engaging
  - iv. Error Tolerant
  - v. Easy to learn

#### c. Nonfunctional requirements

- a. Cost/budgets/timescales
- b. Technical Constraints
- c. Trade-offs

#### d. Problems with requirements gathering

- a. Not enough stakeholder environment
- b. Lack of requirements management
- c. Activities not carried out
- d. Communication problems with stakeholders
- e. Capturing the relevant application domain
- f. People do not understand the problem
- g. Organizational and Political factors
- h. Not knowing what you want
- i. Changing economic and business environments

## Class 13

1. Review
2. Nonfunctional requirements
  - a. Cost/budgets/timescales
  - b. Technical Constraints
  - c. Trade-offs
3. Problems with requirements gathering
  - a. Not enough stakeholder involvement
  - b. Lack of requirements management
  - c. Activities not carried out
  - d. Communication problems with stakeholders
  - e. Capturing the relevant application domain
  - f. People do not understand the problem
  - g. Organizational and Political factors
  - h. Not knowing what you want
  - i. Changing economic and business environments
4. Requirements Specification
  - a. What should be included
    - i. User characteristics
    - ii. Task and task characteristics
    - iii. Various environmental factors
    - iv. Usability
    - v. Constraints, trade-offs, and negotiations
  - b. Guidelines
    - i. Define standard templates for describing requirements
    - ii. Use language simply consistently and concisely
    - iii. Use Diagrams appropriately
    - iv. Supplement natural language with other descriptions of requirements
    - v. Specify requirement qualitatively
5. Prototyping
  - a. Uses
    - i. Communicate and share ideas between designer and users
    - ii. Exploring and demonstrating interaction and design consistency
  - b. Purposes
    - i. Check feasibility
    - ii. Check usefulness
    - iii. Allow users to contribute
    - iv. Allows users to test
    - v. Validate requirements
    - vi. Negotiate requirement
  - c. Types
    - i. Low Fidelity
      1. Sketching
      2. Screen Mockups
      3. Storyboards
      4. Advantages/Disadvantages
    - ii. High Fidelity

- 1. Advantages/Disadvantages
- d. Cautions
  - i. Time and Costs

## Class 14

1. Case Study on Requirements
  - a. Introduction
2. The system
  - a. What they currently had
  - b. What is going to be developed
3. Background information
  - a. The companies
    - i. Tokairo
    - ii. Tankfreight
    - iii. Shell
4. User Requirements gathering
  - a. Domain
  - b. Drivers
  - c. Tasks
  - d. Environment
  - e. Methods used to gather
    - i. Understanding the users
    - ii. Site and system audit
5. Communicating with programmers
6. Benefits

## Class 15

### Work Reengineering and conceptual design

1. Bridging the gap between requirements and design
2. Work Reengineering
  - a. 3 Goals
    - i. Realizing the power and efficiency that automation makes possible
    - ii. Reengineering the work to more effectively support business goals
    - iii. Minimizing retraining by having the new product tap as much as possible into the users existing task knowledge, and maximizing efficiency and effectiveness by accommodating human cognitive constraints and capabilities within the context of their actual tasks.
  - b. Task allocation
    - i. Who/what will provide the data or knowledge necessary to complete task
    - ii. Who/what will physically accomplish the task
  - c. Sidebar on reactions of users
3. The digital Library example
4. Task scenarios
5. Use scenarios
6. Task Allocation for the digital library
  - a. Use Cases
    - i. Essential
    - ii. Concrete
7. Conceptual design
  - a. Content Diagram
  - b. Containers
  - c. Designing
    - i. Derive concrete use cases from essential use cases
    - ii. Identify the primary task objects, attributes, and actions
    - iii. Identify the different containers and the task objects that go into each one
    - iv. Link the containers to show the navigation flow
  - d. Developing using prototypes
  - e. Step 1
  - f. Step 2
    - i. Task objects, attributes, and actions
      1. Primary
      2. Class
      3. Attributes
        - a. Properties
        - b. Child Objects
      4. Actions
    - ii. Marking up uses cases

## Class 16

- a. Review
- b. Step 1
- c. Step 2
  - i. Task objects, attributes, and actions
    - 1. Primary
    - 2. Class
    - 3. Attributes
      - a. Properties
      - b. Child Objects
    - 4. Actions
  - ii. Marking up uses cases
    - 1. Single underline - Nouns for Task Objects
    - 2. Double Underline - The attributes for Task Objects
  - iii. Create a List of findings
  - iv. Prototyping
    - 1. Task Objects
    - 2. Properties
    - 3. Actions
    - 4. Child Objects
      - a. In me - Parent
      - b. I'm In - Child
- d. Creating the Content Diagram
  - i. Template for Container
    - 1. Name
    - 2. Purpose
    - 3. Functions
    - 4. Links
      - a. Single link
      - b. Double link
    - 5. Objects
    - 6. Constraints
  - ii. Main Container
    - 1. Vital Tasks
    - 2. Frequent Tasks
    - 3. Navigational Aids
  - iii. Other Containers
  - iv. Links
  - v. Prototyping containers and links

## Class 17

1. Introduction
2. Sources of Design Guidance
  - a. User Interface Standards
    - i. ISO
      1. 9241 - Ergonomics
      2. 14915 - Software Ergonomics
      3. 13407 - Human Centered Design
      4. 20282 - Ease of Operation
  - b. Style Guides
    - i. Description of required interaction styles and user interface controls covering both the required look (appearance) and feel (behavior)
    - ii. Guidance on when and how to use the various interaction styles or user interface controls.
    - iii. Illustrations of the various interaction styles and user interface controls.
    - iv. Screen templates to show how screens should look.
  - c. Types of Style Guides
    - i. Commercial
    - ii. Customized
  - d. Design Principles
    - i. Simplicity
    - ii. Structure
    - iii. Consistency
    - iv. Tolerance
      1. Recoverability
3. Accessibility
  - a. Principles of Universal Design
  - b. W3C Content Accessibility Guidelines
  - c. Section 508
  - d. Limitations
4. Design Rationale
  - a. Reasons to document
    - i. Documentation can be referred to reconsider decisions
    - ii. Others can understand decisions
  - b. How to record

## Class 18

1. Accessibility
  - a. Principles of Universal Design
  - b. W3C Content Accessibility Guidelines
  - c. Section 508
  - d. Limitations
2. Design Rationale
  - a. Reasons to document
    - i. Documentation can be referred to reconsider decisions
    - ii. Others can understand decisions
  - b. How to record

### Chapter 10

1. Chapter 4 Review
2. Human Action Cycle
  - a. Steps
    - i. Forms a goal
    - ii. Creates and executes actions that move toward that goal
    - iii. Perceives and Interprets the outcome of executing the actions to see whether the goal will be achieved as anticipated.
    - iv. Recognizes that if the goal cannot be achieved, it may have to be reformulated and the cycle repeated.
  - b. Diagram
    - i. Goal Formation - Steps 1      Cognitive
    - ii. Execution - Steps 2,3, and 4      Cognitive and Physical
    - iii. Evaluation - Steps 5,6, and 7      Cognitive

## Class 19

### Chapter 10

1. Exam Review
2. Chapter 4 Review
3. Human Action Cycle
  - a. Steps
    - i. Forms a goal
    - ii. Creates and executes actions that move toward that goal
    - iii. Perceives and Interprets the outcome of executing the actions to see whether the goal will be achieved as anticipated.
    - iv. Recognizes that if the goal cannot be achieved, it may have to be reformulated and the cycle repeated.
  - b. Diagram
    - i. Goal Formation - Steps 1      Cognitive
    - ii. Execution - Steps 2,3, and 4      Cognitive and Physical
    - iii. Evaluation - Steps 5,6, and 7      Cognitive
  - c. Time
  - d. Flexibility
4. Connecting Human Action Cycle to Design
  - a. Prototype Walkthrough
    - i. Predict difficulties that users may face with the design and suggest modifications
    - ii. Suggest suitable changes in the users environment and the systems technology
    - iii. Suggest necessary skills for the users when they work with the UI or identify training needs
  - b. Questions to ask
  - c. Develop Solutions
5. Norman and Draper Model
  - a. Designers model
  - b. User model
  - c. The System Image
6. Connecting the Users model
  - a. Matching the users expectations
  - b. Shaping the users model
  - c. Flexibility
7. Using Metaphors
  - a. Benefits
  - b. Problems
    - i. Metaphors that do not match the users experience
    - ii. Relation to concepts outside of the users experience
  - c. Choosing Metaphors

## Class 20

1. Norman and Draper Model
  - a. Designers model
  - b. User model
  - c. The System Image
2. Connecting the Users model
  - a. Matching the users expectations
  - b. Shaping the users model
  - c. Flexibility
3. Using Metaphors
  - a. Benefits
  - b. Problems
    - i. Metaphors that do not match the users experience
    - ii. Relation to concepts outside of the users experience
  - c. Choosing Metaphors

## Class 21

### Chapter 11

#### Interaction Styles

1. What is an interaction style?
  - a. The way a user communicates with a system and the way the system communicates with them
  - b. Collection of user controls and their behavior
    - i. Provides both:
      1. The look (appearance)
      2. The feel (behavior)
  - c. 5 styles in this chapter
    - i. Command Line
    - ii. Menu Selection
    - iii. Form-Fill
    - iv. Direct Manipulation
    - v. Anthropomorphic
2. Command line
  - a. What is it
  - b. Advantages
  - c. Disadvantages
  - d. Guidelines for design
3. Menu Selection
  - a. What is it
  - b. Advantages
  - c. Disadvantages
  - d. Guidelines for design
4. Form Fill
  - a. What is it
  - b. Advantages
  - c. Disadvantages
  - d. Guidelines for design
5. Direct Manipulation
  - a. What is it
  - b. Advantages
  - c. Disadvantages
  - d. Guidelines for design
6. Anthropomorphic
  - a. What is it
  - b. Advantages
  - c. Disadvantages
  - d. Guidelines for design
7. Blending Styles
8. Choosing a style

## Class 22

### Chapter 12

1. Interaction Devices as tools
  - a. Example of putting up a shelf
2. Why choosing interaction devices matter
3. Why study them
4. Input Devices
  - a. Keyboards, keypads, and buttons
  - b. Pointing devices
5. Keyboards
  - a. Discrete input devices
  - b. Qwerty
  - c. Other Styles
    - i. Big Keys
    - ii. Chord
    - iii. Keypads
  - d. Selecting one
    - i. What size do the keys need to be
    - ii. What shape should it have
    - iii. How robust does it need to be
6. Pointing devices
  - a. Continuous input devices
    - i. Indirect
    - ii. Direct
  - b. Styles - indirect
    - i. Joystick
    - ii. Trackball
    - iii. Graphics tablet
  - c. Styles - direct
    - i. Touchscreen
    - ii. Pen system
    - iii. Light pen
  - d. Selecting one
    - i. How easy to learn does the device need to be
    - ii. How accurate
    - iii. How much time will the user spend on it
    - iv. How much space is available
    - v. How robust does it need to be
    - vi. How manually dexterous is the user
  - e. Speed, Accuracy, and preference
7. Alternatives
  - a. Gesture
    - . Iris and Fingerprint
  - a. Handwriting recognition
  - b. Speech Recognition
8. Output devices

- a. Screens
    - i. CRT
    - ii. LCD
  - b. Loudspeakers
  - c. Simple output
  - d. Refreshable braille displays
9. Alternatives
- a. HUD
  - b. HMD
  - c. Virtual reality

## Class 23

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## Class 24

1. Color
  - a. Usage of color
    - i. To draw attention
    - ii. To show status
    - iii. Make information clearer
    - iv. Display more attractive
  - b. Characteristics of color
  - c. Choosing Colors
  - d. Using Color Effectively
    - i. Number of colors
    - ii. Design for monochrome
    - iii. Color Perception
    - iv. Color for reinforcement
  - e. Presenting information
    - i. Color for emphasis
    - ii. Color for grouping
    - iii. Color Coding
    - iv. Perspective
    - v. Layering
2. Images
  - a. Uses
    - i. Motivate, to attract the attention of the user, to amuse or persuade
    - ii. To communicate information especially special information
    - iii. Overcome language barriers
    - iv. Support Interaction
  - b. Using Effectively
    - i. Pictures
    - ii. Diagrams
    - iii. Graphs and charts
  - c. Selecting
    - i. Choose the most appropriate type of image
    - ii. Design the image so that it meets requirements of the task
    - iii. Follow any relevant conventions
    - iv. Combining text and images is effective
    - v. Take the users screen resolution into account
    - vi. Images, particularly photographs can result in large files and long download times
3. Moving Images
  - a. Uses
    - i. Illustrate movement
    - ii. Provide dynamic feedback
    - iii. Attract attention
    - iv. Show that the computer system is operating
  - b. Video Clips
    - i. Convey human behavior and emotions
    - ii. Show events the user cannot see directly
    - iii. To motivate

- iv. Provide additional context information
- 4. Sound
  - a. Uses
    - i. Applications where the eyes and attention are required to be away from the screen
    - ii. Applications involving process control
    - iii. Applications addressing the needs of visually impaired users
  - b. Types
    - i. Ambient Sound and sound effects
    - ii. Music
    - iii. Speech
  - c. Good Usage
    - i. Reinforce the visual component of the UI
    - ii. Confirm the successful completion of an operation
    - iii. Attract attention
  - d. Using music effectively
  - e. Speech Effectively
  - f. Problems

## Class 25

1. Sound
  - a. Uses
    - i. Applications where the eyes and attention are required to be away from the screen
    - ii. Applications involving process control
    - iii. Applications addressing the needs of visually impaired users
  - b. Types
    - i. Ambient Sound and sound effects
    - ii. Music
    - iii. Speech
  - c. Good Usage
    - i. Reinforce the visual component of the UI
    - ii. Confirm the successful completion of an operation
    - iii. Attract attention
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  - e. Speech Effectively
  - f. Problems

## Chapter 14

1. Design Areas/Paradigm
2. Combine interaction devices and software components
3. Principles of good layout
  - a. Create Natural Groupings
  - b. Separate the currently active components
  - c. Emphasize important components
  - d. Use White space effectively
  - e. Make the controls visible
  - f. Balance Aesthetics and Usability
4. Examples
5. What is a design area
  - a. GUI
  - b. Web Pages
  - c. Embedded systems
6. Technological convergence
7. Ubiquitous Computing
8. Designing the UI
  - a. Identify the relevant design area, and think about the specific principles, guidelines, and issues for that design area
  - b. Consider the conceptual design that you created in response to your requirements-gathering activities
  - c. Combine the design components taking into account the demands of the design area and what you want to happen in the UI to meet the requirements

## Chapter 15 Case Study Review

1. Overview of case study

## Class 26

### Chapter 14

1. Design Areas/Paradigm
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### Chapter 15 Case Study Review

9. Overview of case study

## Class 27

1. What is a design area
  - a. GUI
  - b. Web Pages
  - c. Embedded systems
2. Technological convergence
3. Ubiquitous Computing
4. Designing the UI
  - a. Identify the relevant design area, and think about the specific principles, guidelines, and issues for that design area
  - b. Consider the conceptual design that you created in response to your requirements-gathering activities
  - c. Combine the design components taking into account the demands of the design area and what you want to happen in the UI to meet the requirements

### Chapter 15 Case Study Review

5. Overview of case study

### Chapter 16 GUI

1. Widgets
  - a. How do you choose the correct widget
  - b. How do you use the widget correctly
  - c. How do you combine widgets
2. Style guides for GUI
3. Appearance of Widgets in Different pieces of software
4. Energetic Sports Center Scenario

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