

**CS 5551: User Interface Design (4)****Catalog Description:**

Design and layout of interactive programs using components, containers, events, menus, and dialogs. The use of graphics primitives, color and images; giving user feedback and help. Rapid prototyping and interface management systems. Design for accessibility and usability.

**Textbooks:**

Ben Shneiderman, Catherine Plaisant, *Designing the User Interface*, Fourth Edition, Addison Wesley (March 31, 2004), ISBN 0-321-19786-0.

Kathy Walrath, Mary Campione, Alison Huml, Sharon Zakhour, *The JFC Swing Tutorial: A Guide to Constructing GUIs*, Second Edition Addison-WesleyProfessional; (February 27, 2004) ISBN 0-201-91467-0.

**Course Goals:**

The course provides an introduction to the theory and practice of designing a user interface to an application program. On the theoretical side, it covers general principles, theories, and guidelines for interface development, software tools, direct manipulation and virtual environments, multiple-window strategies, and information search and visualization. On the practical side, the course covers design and implementation of applications in the Java language, using interface components such as top-level containers, menus, dialogs, and pop-ups.

**Prerequisites by Course & Topic**

CS 2511: Software Development – use of software libraries, design of large-scale software, basic user interface concepts

MA 1297 (Calculus II) or MATH 2326 (Intro to Linear Algebra): vectors, transformations

**Major Topics Covered in the Course**

- Design, layout, and implementation of a user interface
- The software architecture of a graphical user interface system
- Implementation of common interaction techniques
- The software development process for user interfaces
- Human factors issues in user interface design

**Class/Laboratory Schedule:** Lecture: 3 hours per week, Laboratory: 1

**Course Outcomes**

1. Familiarity with the software architecture of graphical user interfaces.
  - a. Understand how to build a hierarchy of a graphical user interface system.
  - b. Understand the event loop concept and the event queue.
  - c. Understand the use of properties such as color, labels and icons.
2. Ability to design, lay out, and implement a graphical user interface.
  - a. Analyze the requirements for an interface.
  - b. Identify and decompose the tasks required of the application.
  - c. Map the tasks to user interface components.
  - d. Implement functionality via listeners.
  - e. Selection of appropriate fonts, colors, and interaction techniques.
3. Ability to implement a variety of interaction techniques.
  - a. Implement techniques such as rubber-banding, dragging, cut, copy, paste, and direct manipulation in general.
  - b. Implement feedback techniques such as highlighting, blinking, state messages.
  - c. Implement context sensitive help messages for the user.
4. Familiarity with the graphical user interface software development process.

- a. Understand how specification grammars can aid in designing a user interface.
  - b. Understand the role of rapid prototyping for new applications.
  - c. Understand user interface management systems for maintenance of applications with user interfaces.
5. Understanding human factors issues in user interface design.
- a. Understand the diversity of users with respect to both general computer knowledge and application domain knowledge.
  - b. Understand the diversity of users with respect to physical, cognitive, and perceptual abilities, differing personalities, and cultural differences.
  - c. Understand how to design user interfaces for people with disabilities such as limited vision, color blindness, limited hearing, and limited mobility.

**Relationship to Program Outcomes**

In order to take CS 5551, students must have completed Calculus II and Systems Analysis and Design. This course contributes to meeting the following program outcomes:

2. *Students can design, develop, and analyze significant software systems.*

Students gain additional understanding of the design of very large systems. They gain proficiency in designing and implementing systems using reusable code and software libraries. Course outcomes 1-5 map to this program outcome.

4 *Students can apply computer science principles and practices to a variety of problems.*

Students have the opportunity to develop GUIs using Java. Course outcomes 1-5 map to this program outcome.

**Assessment Plan for Course:**

This course is assessed every third year by the instructor and a course assessment document covering all of the course outcomes and their effect on the program outcomes is prepared.

**Estimate CSAB Category Content**

	CORE	ADVANCED		CORE	ADVANCED
Data Structures			Computer Organization and Architecture		
Algorithms			Concept of Programming Languages		
Software Design		2			

**Coordinator/Prepared by:** D. Dunham