

# Introduction to Human-Computer Interaction

## Introduction to Human-Computer Interaction (HCI)

Course-level overview – concise, organized, and ready for study or presentation.

### 1. What Is HCI?

| Aspect               | Description                                                                                                                                                          |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Definition           | The interdisciplinary study of how people interact with computers, software, and digital devices, and how to design technology that supports user goals effectively. |
| Core Goal            | Create usable, useful, and enjoyable interactive systems.                                                                                                            |
| Disciplines Involved | Computer Science, Psychology, Design, Ergonomics, Sociology, Anthropology, Linguistics, and Engineering.                                                             |
| Key Terms            | Usability, User Experience (UX), User Interface (UI), Interaction Design, Cognitive Load, Affordance, Feedback, Accessibility.                                       |

### 2. Historical Milestones

| Era         | Milestone                                                                           | Impact                                                                       |
|-------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------|
| 1940s–1950s | Early computers (ENIAC, UNIVAC) – batch processing, no direct interaction.          | Interaction limited to punched cards and printed output.                     |
| 1960s       | Sketchpad (Ivan Sutherland, 1963) – first graphical interface, direct manipulation. | Introduced concepts of windows, menus, and graphical objects.                |
| 1970s       | Xerox Alto (1973) – mouse, GUI, WYSIWYG text editing.                               | Demonstrated the feasibility of personal interactive workstations.           |
| 1980s       | Apple Macintosh (1984) & Windows 1.0 (1985) – commercial GUIs.                      | Popularized icons, windows, drag-and-drop; sparked the “desktop metaphor.”   |
| 1990s       | World Wide Web (1991) – hypertext navigation, browsers.                             | Shifted focus to information architecture and web usability.                 |
| 2000s       | Mobile smartphones, touchscreens, multitouch (iPhone 2007).                         | Brought gesture-based interaction, responsive design, and context awareness. |

# Introduction to Human-Computer Interaction

| Era               | Milestone                                                 | Impact                                                                                                  |
|-------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------|
| 2010s?<br>present | Voice assistants, AR/VR, wearables, AI-driven interfaces. | Expanded interaction modalities; emphasized natural language, embodied interaction, and ethical design. |

---

## 3. Foundations of HCI Design

### 3.1. Human Factors & Cognitive Psychology

- **Perception:** Visual acuity, auditory limits, haptic sensitivity.
- **Memory:** Short-term ( $7 \pm 2$  items), long-term retrieval cues.
- **Mental Models:** Users develop internal representations of how a system works; design should align with or shape these models.
- **Attention:** Limited capacity → avoid unnecessary distractions; use visual hierarchy.

### 3.2. Usability Principles (Nielsen's Heuristics)

1. **Visibility of system status** – keep users informed.
2. **Match between system & real world** – use familiar language & concepts.
3. **User control & freedom** – undo/redo, easy navigation.
4. **Consistency & standards** – predictable behavior.
5. **Error prevention** – design to avoid mistakes.
6. **Recognition rather than recall** – visible options, shortcuts.
7. **Flexibility & efficiency of use** – support novices & experts.
8. **Aesthetic & minimalist design** – eliminate irrelevant information.
9. **Help users recognize, diagnose, recover from errors.**
10. **Help & documentation** – accessible when needed.

### 3.3. Interaction Styles

| Style          | Typical Devices     | Example    |
|----------------|---------------------|------------|
| Command line   | Keyboard, terminals | Unix shell |
| Menu selection | Desktop, mobile     |            |