INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal, Hyderabad - 500 043

COMPUTER SCIENCE AND ENGINEERING (Data Science)
DEFINITION AND TERMINOLOGY

Course Title	**HUMAN COMPUTER INTERACTION (UI and UX)**				
Course Code	ACDC12				
Program	B.Tech				
Semester	VII	CSE(DS)			
Course Type	Elective				
Regulation	IARE-UG20				
Course Structure	Theory			Practical	
	Lecture	Tutorials	Credits	Laboratory	Credits
	3	-	3	-	-
Course Coordinator	Mr.J.Gangadhar, Assistant professor				

COURSE OBJECTIVES:
The students will try to learn:

I	The Essentials of designing interactive systems.
II	The different Techniques for designing interactive systems.
III	The Contexts for designing interactive systems.
IV	The important aspects of implementation of human-computer interfaces.
V	Identify the various tools and techniques for interface analysis, design, and evaluation.

COURSE OUTCOMES:
After successful completion of the course, students should be able to:

CO 1	**Understand** the fundamental principles of HCI, including usability, accessibility, user-centered design, and user experience for successful computer interface.	Understand
CO 2	**Create** Create user persons that represent different user archetypes helping to understand and empathize with diverse user groups during the design process.	Apply
CO 3	**Create** Create interactive prototypes of digital interfaces allowing for early testing and validation of design ideas.	Apply

CO 4	**Understand** the principles and challenges of designing interfaces that support visual interface and multiple interaction modalities, such as GUI, touch, voice, gestures, and haptics.	Understand
CO 5	**Understand** how to maintain consistency in the user experience across different platforms and devices to provide a seamless experience for users.	Understand
CO 6	**Apply** Design user interfaces and interactions suitable for different devices and platforms present in Ubiquitous Computing environments	Apply

DEFINITION AND TERMINOLOGY:

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	MODULE I	
	ESSENTIALS OF DESIGNING INTERACTIVE SYSTEMS	
1	**What does HCI stand for?**	CO 1
	Human-Computer Interaction.	
2	**What does UI and UX stand for in the context of HCI?**	CO 1
	UI stands for User Interface and UX stands for User Experience.	
3	**State the goal of system design?**	CO 1
	The goal of system design is to allocate the requirements of a large system to hardware and software components.	
4	**Give the best description of a conceptual model?**	CO 1
	A high level description of how a system is organized and how it operates.	
5	**State the best example of triangulation in data gathering?**	CO 1
	collecting data from users in different ways with different methods.	
6	**State the primary goal of interactive systems design?**	CO 1
	The primary goal of interactive systems design is to create interfaces that are intuitive, engaging, and easy to use, enhancing user satisfaction and efficiency	
7	**What is user-centered design in interactive systems?**	CO 1
	User-centered design in interactive systems involves designing interfaces based on the needs, preferences, and behaviors of the end-users, prioritizing their experience throughout the design process.	
8	**Name one usability evaluation method used by interactive systems designers?**	CO 1
	One usability evaluation method used by interactive systems designers is "Usability Testing," where representative users perform specific tasks on the interface while the designer observes and gathers feedback.	
9	**How do personas help interactive systems designers?**	CO 1

	Personas help interactive systems designers understand their target users better by creating fictional characters that represent different user groups, enabling designers to design with specific user needs and behaviors in mind. .	

10	**Define Information Architecture in the context of interactive systems?**	CO 1
	Information Architecture in interactive systems refers to the organization and structure of information within the interface, aiming to make it easy for users to find and navigate content.	
11	**Name one wire framing tool commonly used by interactive systems designers**	CO 1
	: One commonly used wire framing tool by interactive systems designers is "Sketch."	
12	**What are personas in the context of human-centered interactive systems design?**	CO 1
	Personas are fictional characters representing specific user types within the target audience. They help designers understand users' needs, motivations, and behaviors to create more user-centered interfaces	
13	**How do personas benefit the interactive systems design process?**	CO 1
	Personas provide a clear understanding of users' goals and challenges, guiding designers to develop interfaces that cater to different user needs and preferences effectively.	
14	**What are scenarios used for in human-centered interactive systems design?**	CO 1
	Scenarios are narratives that describe how users interact with the system in real-life situations. They help designers anticipate user behavior and design interfaces that align with users' expected interactions	
15	**How do scenarios contribute to the design decision-making process?**	CO 1
	Scenarios provide valuable insights into how users might use the interactive system, helping designers make informed decisions and prioritize features that enhance the overall user experience	
16	**In what way do personas and scenarios complement each other during design?**	CO 1
	Personas and scenarios work together to create a holistic understanding of users and their interactions with the system. Personas inform the creation of scenarios, while scenarios validate and refine the personas.	
17	**What is the importance of user feedback in the interactive systems design process?**	CO 1
	User feedback is essential in the interactive systems design process as it provides valuable insights into user preferences, pain points, and expectations, allowing designers to make informed improvements and iterations.	

18	**What is the significance of accessibility in interactive systems design?**	CO 1
	Accessibility is vital in interactive systems design to ensure that people with disabilities can use the interface effectively, promoting inclusivity and compliance with accessibility standards.	
19	**State the best example of triangulation in data gathering?**	CO 1
	Collecting data from users in different ways with different methods.	
20	**Why is prototyping essential in interactive systems design?**	CO 1
	Prototyping is crucial in interactive systems design as it allows designers to test and refine their ideas before final implementation, gathering feedback and identifying potential issues early in the design process.	
	MODULE II	
	TECHNIQUES FOR DESIGNING INTERACTIVE SYSTEMS	
1	**What is participative design in human-computer interaction (HCI)?**	CO 2
	Participative design in HCI involves involving end-users actively in the design process, encouraging collaboration and feedback to create user-centered interfaces.	

2	**Name one technique used to facilitate participative design in HCI.**	CO 2
	"Co-design workshops" are commonly used techniques to facilitate participative design in HCI, where designers and users collaborate in designing prototypes and interfaces together.	
3	**Why is user involvement crucial in participative design?**	CO 2
	User involvement is crucial in participative design as it helps designers gain a deeper understanding of user needs, behaviors, and preferences, leading to more relevant and user-friendly designs.	
4	**How does participative design promote user engagement?**	CO 2
	Participative design fosters user engagement by allowing users to actively contribute to the design process, making them feel valued and invested in the final product.	
5	**Define the role do usability tests play in participative design?**	CO 2
	Usability tests are conducted in participative design to gather user feedback on prototypes and interface designs, ensuring that the final product aligns with user expectations.	
6	**Tell me the potential challenges of implementing participative design in HCI?**	CO 2
	Some potential challenges of participative design in HCI include coordinating schedules for user involvement, managing diverse user inputs, and balancing design decisions based on multiple perspectives.	
7	**How does participative design help in reducing design iterations?**	CO 2
	Participative design involves continuous user feedback, which allows designers to identify issues and make improvements early in the design process, reducing the need for extensive design iterations later.	
8	**What is the role of iterative prototyping in participative design?**	CO 2
	Iterative prototyping in participative design allows users to interact with and provide feedback on various design versions, ensuring that the final interface meets their needs effectively.	
9	**What is card sorting in the context of user experience design?**	CO 2
	Card sorting is a user research technique used in user experience design to gather insights about how users categorize and organize information or content within an interface.	
10	**How does card sorting help in information architecture design?**	CO 2
	Card sorting helps designers create effective information architecture by understanding how users group and label information, leading to intuitive navigation and content organization.	
11	**Explain "Open Card Sorting."**	CO 2

	In Open Card sorting, participant's group and label cards (representing content or information) into categories they create themselves, providing insights into their mental models and organization preferences.	
12	**Describe "Closed Card Sorting."**	CO 2
	In Closed Card Sorting, participants organize cards into predefined categories provided by the researchers, helping designers evaluate the effectiveness of existing information architecture.	
13	**Name one software tool commonly used for conducting card sorting sessions.**	CO 2
	Optimal Workshop is one software tool commonly used for conducting card sorting sessions online.	

14	**What is the significance of analyzing the results of a card sorting session?**	CO 2
	Analyzing card sorting results allows designers to identify patterns in user categorization, providing valuable insights to inform the information architecture and design improvements.	
15	**How can card sorting sessions be conducted remotely?**	CO 2
	Card sorting sessions can be conducted remotely using online tools that allow participants to interact with virtual cards and provide their organization and labeling preferences.	
16	**When is the best time to conduct a card sorting session in the design process?**	CO 2
	Card sorting sessions are most effective when conducted during the early stages of the design process, preferably before the information architecture is finalized, to influence design decisions effectively.	
17	**In user-centered design, why is it essential to combine both artefact collection and desk work?**	CO 2
	Combining artefact collection and desk work allows researchers to gather real-world data from users and then analyze and synthesize that data to gain meaningful insights, leading to more informed and user-centric design outcomes	
18	**What is the importance of finding suitable representations in Human-Computer Interaction (HCI)?**	CO 2
	Finding suitable representations in HCI is crucial as it directly impacts how users perceive and interact with the interface, influencing the overall user experience.	
19	**Name one method used in the iterative design process of HCI.**	CO 2
	"Prototyping" is one method commonly used in the iterative design process of HCI, allowing designers to create and test interface versions before final implementation.	
20	**In HCI, what is the significance of creating personas?**	CO 2
	Creating personas in HCI helps designers understand their target users better by developing fictional characters that represent different user types, guiding the design process to cater to specific user needs and behaviors.	

MODULE III		
VISUAL INTERFACE DESIGN, MULTIMODAL INTERFACE DESIGN		
1	**What is visual interface design in HCI?**	CO 3
	Visual interface design in HCI refers to the process of creating the visual elements, layout, and aesthetics of the user interface to enhance usability and user experience.	
2	**How does visual interface design influence user perception in HCI?**	CO 3
	Visual interface design influences user perception by creating a visually appealing and intuitive interface that communicates information effectively.	
3	**Name one example of a visual element in HCI.**	CO 3
	Icons are an example of a visual element commonly used in HCI to represent actions, objects, or concepts.	
4	**How can color choices impact the user experience in visual interface design?**	CO 3
	Color choices can impact the user experience by conveying meaning, highlighting important elements, and evoking specific emotions or associations.	
5	**What role does typography play in visual interface design for HCI?**	CO 3
	Typography in visual interface design is essential for legibility, readability, and setting the tone of the interface's content.	
6	**How can visual consistency enhance the usability of an interface?**	CO 3
	Visual consistency enhances usability by providing a familiar and predictable interface, making it easier for users to navigate and understand the system.	
7	**What is the purpose of visual hierarchy in HCI?**	CO 3
	Visual hierarchy in HCI helps prioritize information and guide users' attention to essential elements, improving the overall organization and clarity of the interface.	
8	**How does visual interface design contribute to brand identity in HCI?**	CO 3
	Visual interface design contributes to brand identity by incorporating consistent branding elements, such as logos and color schemes, throughout the interface.	
9	**Why is whitespace important in visual interface design?**	CO 3
	Whitespace is essential in visual interface design as it provides breathing space between elements, improves readability, and reduces visual clutter. .	

10	**How can visual interface design support accessibility in HCI?**	CO2
	Visual interface design can support accessibility by ensuring sufficient contrast, providing alternative text for images, and accommodating font size adjustments for users with visual impairments.	
11	**What is a Graphical User Interface (GUI) in HCI?**	CO 3
	A Graphical User Interface (GUI) is a type of user interface that uses graphical elements such as icons, buttons, and windows to allow users to interact with a computer system	
12	**How do GUIs enhance user interactions in HCI?**	CO 3
	GUIs enhance user interactions in HCI by providing visual representations and intuitive controls that make it easier for users to interact with the system.	
13	**Name one advantage of using GUIs in HCI.**	CO 3
	One advantage of using GUIs in HCI is their ease of use, allowing users to perform tasks through visual and point-and-click interactions.	
14	**How do GUIs improve the learn ability of computer systems?**	CO 3
	GUIs improve learn ability by providing visual cues and icons that make it easier for users to understand and remember how to perform specific tasks.	
15	**What are some common GUI elements used in HCI?**	CO 3
	Some common GUI elements used in HCI include buttons, checkboxes, radio buttons, drop-down menus, and text fields.	
16	**What role do icons play in GUI design?**	CO 3
	Icons in GUI design represent actions, objects, or concepts, helping users quickly identify and perform tasks without relying on text-based instructions.	
17	**How can GUIs be customized for different user preferences in HCI?**	CO 3
	GUIs can be customized by providing options to adjust colors, font sizes, and layouts, allowing users to tailor the interface to their individual needs and preferences.	
18	**What is the significance of responsive design in GUIs for different devices?**	CO 3
	Responsive design in GUIs ensures that the interface adapts and displays correctly on various devices, such as desktop computers, tablets, and smart phones, providing a consistent user experience.	

19	**Name one guideline for creating intuitive GUIs.**	CO 3
	"Keep the interface simple and uncluttered" is one guideline for creating intuitive GUIs.	
20	**Define visualization in HCI?**	CO 3
	Visualization in HCI involves representing data, information, or concepts using visual elements to aid understanding and decision-making.	
	MODULE IV	
	CONTEXTS FOR DESIGNING INTERACTIVE SYSTEMS	
1	**Why is user-centered design important in website design?**	CO 4
	User-centered design ensures that websites are tailored to meet the needs and preferences of the target users, leading to a better user experience.	
2	**Name one usability principle that is crucial in website design.**	CO 4
	"Visibility of system status" is one usability principle that is crucial in website design; ensuring users are provided with clear feedback about system actions and current states.	
3	**How can wireframes benefit the website design process?**	CO 4
	Wireframes help in planning and visualizing the website layout and structure, allowing designers to get an early sense of the website's content and interactions.	
4	**What role does responsive design play in website development?**	CO 4
	Responsive design ensures that websites adapt and display appropriately across different devices and screen sizes, providing a consistent user experience.	
5	**What is the purpose of conducting usability testing in website design?**	CO 4
	Usability testing helps identify usability issues and gather feedback from real users to improve the website's design and functionality. .	
6	**Name one design principle to consider for improving website navigation.**	CO 4
	"Consistency in navigation" is one design principle to consider for improving website navigation, ensuring users can easily find and access information.	
7	**Why is accessibility important in website design?**	CO 6
	Accessibility ensures that websites are usable by all users, including those with disabilities, providing equal access to information and services.	
8	**How can color choices impact the user experience in website design?**	CO 4

	Color choices can influence emotions, readability, and visual hierarchy, affecting the overall user experience on the website.	
9	**What is the significance of call-to-action buttons in website design?**	CO 4
	Call-to-action buttons prompt users to take specific actions, such as signing up or making a purchase, driving conversions and user engagement on the website	

10	**How does user research benefit website development in HCI?**	CO 4
	User research helps understand user needs and behaviors, guiding the design process to create websites that meet user expectations.	
11	**Name one prototyping method used in website development.**	CO 4
	"Wireframing" is one prototyping method commonly used in website development to create low-fidelity layouts.	
12	**What is the purpose of conducting usability testing in website development?**	CO 4
	Usability testing helps identify usability issues and gather user feedback to improve the website's design and user experience.	
13	**How can responsive design contribute to website development?**	CO 4
	Responsive design ensures that websites adapt and display correctly on various devices and screen sizes, enhancing user experience and accessibility.	
14	**What is the role of CSS in website development?**	CO 4
	CSS (Cascading Style Sheets) is used in website development to control the presentation and layout of web pages, including fonts, colors, and spacing.	
15	**Why is accessibility crucial in website development?**	CO 4
	Accessibility ensures that websites are usable by all users, including those with disabilities, promoting inclusivity and equal access to information.	
16	**What is navigation design in the context of websites and HCI?**	CO 4
	Navigation design involves creating the structure and layout of menus, links, and interactive elements to facilitate user movement and exploration on a website.	
17	**Name one principle that should be considered for intuitive navigation design.**	CO 4
	"Principle of Consistency" is one principle that should be considered for intuitive navigation design, ensuring that navigation elements are consistently placed and labeled across the website.	
18	**How can user testing help in refining navigation design?**	CO 4
	User testing allows designers to observe how users interact with the navigation elements and identify any usability issues, leading to improvements in the navigation design.	
19	**What is the purpose of creating a sitemap in navigation design?**	CO 4
	A sitemap provides a visual representation of the website's structure and content, aiding in the planning and organization of navigation elements.	

20	**Name one technique to simplify website navigation design.**	CO 4
	"Progressive Disclosure" is one technique to simplify website navigation design, presenting information gradually to reduce cognitive overload.	
MODULE V		
WEB SECURITY		
1	**Define ubiquitous computing in the context of HCI.**	CO 5
	Ubiquitous computing in HCI refers to the concept of seamlessly integrating computers and technology into everyday objects and environments, making them pervasive and interconnected..	
2	**How does ubiquitous computing enhance user experiences?**	CO 5
	Ubiquitous computing enhances user experiences by providing continuous access to information and services, regardless of location, leading to increased convenience and efficiency.	
3	**Name one example of a ubiquitous computing device.**	CO 6
	"Smartphone" is one example of a ubiquitous computing device that allows users to access various applications and services on the go.	
4	**Name one benefit of ubiquitous computing in healthcare.**	CO 5
	One benefit of ubiquitous computing in healthcare is remote patient monitoring, allowing healthcare professionals to monitor patients' health conditions from a distance.	
5	**What are blended spaces in the context of HCI?**	CO 5
	TBlended spaces in HCI refer to environments where physical and digital elements are combined to create seamless interactions and experiences.	
6	**Name one example of a blended space in ubiquitous computing.**	CO 6
	"Smart homes" are an example of blended spaces in ubiquitous computing, where IoT devices are integrated into the physical environment to control and automate home functions.	
7	**How can HCI principles improve the design of blended spaces?**	CO 5
	HCI principles can improve the design of blended spaces by focusing on user-centered design, accessibility, and ensuring that the digital elements complement the physical environment.	
8	**Name one benefit of blended spaces in retail environments.**	CO 5
	One benefit of blended spaces in retail environments is personalized and interactive shopping experiences through the integration of digital displays and mobile devices.	

9	**What is the purpose of navigation in wireless sensor networks?**	CO 5
	The purpose of navigation in wireless sensor networks is to efficiently transmit data from sensor nodes to a designated destination or sink node.	
10	**Name one example of a routing protocol used for data navigation in wireless sensor networks.**	CO 6
	"Ad hoc On-Demand Distance Vector (AODV)" is one example of a routing protocol used for data navigation in wireless sensor networks.	
11	**How does data aggregation contribute to efficient data navigation in wireless sensor networks?**	CO 6
	Data aggregation combines and summarizes data from multiple sensor nodes before transmission, reducing the amount of data traffic and conserving energy.	
12	**Name one technique used to optimize energy consumption during data navigation in wireless sensor networks**	CO6
	"Sleep scheduling" is one technique used to optimize energy consumption during data navigation by putting sensor nodes into sleep mode to conserve power.	
13	**Define mobile computing in the context of HCI.?**	CO 5
	Mobile computing refers to the use of portable devices, such as smart phones and tablets, to access and interact with digital information and services while on the move.	
14	**How does mobile computing impact user accessibility?**	CO 5
	AMobile computing enhances user accessibility by allowing users to access information and services from anywhere, at any time, using their mobile devices.	
15	**Name one example of a mobile computing device.**	CO 5
	"Smartphone" is one example of a mobile computing device commonly used for communication, web browsing, and accessing applications.	
16	**How can HCI principles improve the design of mobile interfaces?**	CO 5
	HCI principles can improve the design of mobile interfaces by focusing on usability, responsiveness, and ensuring a seamless user experience on smaller screens.	
17	**What role does touch interaction play in mobile computing?**	CO 5
	Touch interaction is a primary input method in mobile computing, enabling users to interact with the device's interface through gestures and touch-sensitive screens.	

18	**How does mobile computing support location-based services in HCI?**	CO 5
	Mobile computing allows devices to use GPS and other location-based technologies, enabling location-based services like navigation and location-based recommendations.	
19.	**Name one benefit of wearable computing in healthcare.**	CO 5
	One benefit of wearable computing in healthcare is continuous health monitoring, allowing individuals and healthcare professionals to track vital signs and fitness metrics.	
20	**What are smart materials in the context of HCI? Name one example of a smart material used in HCI.**	CO 5
	Smart materials in HCI are materials that can change their properties in response to external stimuli, such as temperature, light, or electrical signals. "Shape-memory alloys" are one example of smart materials used in HCI, as they can change shape when subjected to temperature changes.	

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