Uka Tarsadia University

B. Tech.
CSE / CSE (AI&ML) / CSE (CC) / CSE (CS) / CE / CE (SE) / IT
Semester VI

Program Elective -IV
HUMAN MACHINE INTERFACE
CE5037

EFFECTIVE FROM December-2024

Syllabus version: 1.00

Subject Code	Subject Title
CE5037	Human Machine Interface

Teaching Scheme				Examination Scheme			
Hours		Credits		Theory Marks		Practical Marks	Total Marks
Theory	Practical	Theory	Practical	Internal	External	CIE	
3	0	3	0	40	60	0	100

Objectives of the course:
- To understand the fundamental concepts and components of human-computer interaction (HCI).
- Understand interaction design principles for software development and apply design rules for user interface implementation.
- To assess and enhance the usability of interactive systems, the creation of inclusive and accessible interactive systems for diverse user populations.

Course outcomes:
Upon completion of the course, the student shall be able to,

CO1: Understand the fundamental concepts and components of human-computer interaction.
CO2: Learn interaction principles for designing effective interactive systems.
CO3: Learn interaction design principles and HCI integration in software development.
CO4: Apply design rules and usability principles in user interfaces implementation.
CO5: Understand evaluation techniques to assess and improve the usability of interactive systems.
CO6: Create inclusive and accessible interactive systems for diverse user populations.

Sr. No.	Topics	Hours
	Unit – I	
1	**The Human:** Introduction, Input-output channels, Human memory, Thinking - reasoning and problem solving, Emotion, Individual differences.	9

	Psychology and the design of interactive systems. **The Computer:** Introduction, Text entry devices, Positioning, Pointing and drawing, Display devices, Devices for virtual reality and 3D interaction, Physical controls, Sensors and special devices, Paper - printing and scanning, Memory, Processing and networks.	
Unit – II		
2	**The Interaction:** Introduction, Models of interaction, Frameworks and HCl, Ergonomics, Interaction styles, Elements of the WIMP interface, Interactivity, The context of the interaction, Experience, Engagement and fun, Paradigms for interaction. **Interaction Design Basics:** What is design? The process of design, User focus, Scenarios, Navigation design, Screen design and layout, Iteration and prototyping.	8
Unit – III		
3	**HCI in Software Process:** Introduction to HCI in the software process, The software life cycle, Usability engineering, Iterative design and prototyping, Design rationale.	6
Unit – IV		
4	**Design Rules:** Introduction to design rules, Principles to support usability, Standards guidelines, Golden rules and heuristics, HCI patterns. **Implementation Support:** Implementation support, Elements of windowing systems, Programming the application, Using toolkits, User interface management systems.	8
Unit – V		
5	**Evaluation Techniques:** What is evaluation? Goals of evaluation, Evaluation through expert analysis, Evaluation through user participation, Choosing an evaluation method. **Universal Design:** Introduction, Universal design principles, Multi-modal interaction, Designing for diversity.	8
Unit – VI		
6	**User Support:** Requirements of user support, Approaches to user support, Adaptive help systems, Designing user support systems.	6

Text book:
1. Alan Dix, Janet Finlay, Gregory D. Abowd, Russell Beale, "Human–Computer Interaction", Third Edition, Pearson.

Reference books:
1. Jenifer Tidwell, "Designing Interfaces: Patterns for Effective Interaction Design".

Course objectives and Course outcomes mapping:
- To understand the fundamental concepts and components of human-computer interaction (HCI): CO1, CO2
- To Understand interaction design principles for software development and apply design rules for user interface implementation: CO3,CO4
- To assess and enhance the usability of interactive systems, the creation of inclusive and accessible interactive systems for diverse user populations: CO5, CO6

Course units and Course outcomes mapping:

Unit No.	Unit Name	Course Outcomes					
		CO1	CO2	CO3	CO4	CO5	CO6
1	The Human and The Computer	✓					
2	The Interaction and Interaction Design Basics		✓				
3	HCI in Software Process			✓			
4	Design Rules and Implementation Support				✓		
5	Evaluation Techniques and Universal Design					✓	
6	User Support						✓

Programme outcomes:

PO 1: Engineering knowledge: An ability to apply knowledge of mathematics, science, and engineering.

PO 2: Problem analysis: An ability to identify, formulates, and solves engineering problems.

PO 3: Design/development of solutions: An ability to design a system, component, or process to meet desired needs within realistic constraints.

PO 4: Conduct investigations of complex problems: An ability to use the techniques, skills, and modern engineering tools necessary for solving engineering problems.

PO 5: Modern tool usage: The broad education and understanding of new engineering techniques necessary to solve engineering problems.

PO 6: The engineer and society: Achieve professional success with an understanding and appreciation of ethical behavior, social responsibility, and diversity, both as individuals and in team environments.

PO 7: Environment and sustainability: Articulate a comprehensive world view that integrates diverse approaches to sustainability.

PO 8: Ethics: Identify and demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.

PO 9: Individual and team work: An ability to function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO 10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give/receive clear instructions.

PO 11: Project management and finance: An ability to demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12: Life-long learning: recognition of the need for, and an ability to engage in life-long learning.

Programme outcomes and Course outcomes mapping:

Programme Outcomes	Course Outcomes					
	CO1	CO2	CO3	CO4	CO5	CO6
PO1	✓					
PO2					✓	
PO3		✓	✓	✓		✓
PO4			✓			
PO5		✓				
PO6						✓
PO7						✓
PO8				✓		✓
PO9			✓			
PO10				✓		
PO11					✓	
PO12	✓	✓	✓	✓	✓	✓