

Programme Name/s : Artificial Intelligence/ Artificial Intelligence and Machine Learning/ Cloud Computing and Big Data/ Computer Technology/ Computer Engineering/ Computer Science & Engineering/ Data Sciences
Programme Code : AI/ AN/ BD/ CM/ CO/ CW/ DS
Semester : Fourth
Course Title : USER INTERFACE DESIGN
Course Code : 314014

I. RATIONALE

In digital applications, the user communicates with the product via user interface. This course is designed to elicit fundamental principles and practical skills from stakeholders which are essential to design user friendly interfaces. The course will help students to apply design thinking concepts to create or re-create the prototype.

II. INDUSTRY / EMPLOYER EXPECTED OUTCOME

The aim of this course is to help the students to attain the following industry identified outcome through various teaching learning experiences:

Design user-centered applications, websites, interfaces.

III. COURSE LEVEL LEARNING OUTCOMES (COS)

Students will be able to achieve & demonstrate the following COs on completion of course based learning

- CO1 - Explain design thinking concept.
- CO2 - Interpret user requirements.
- CO3 - Select appropriate visual design for given problem.
- CO4 - Create interactions using design tool.
- CO5 - Create innovative design prototype for given applications.

IV. TEACHING-LEARNING & ASSESSMENT SCHEME

Course Code	Course Title	Abbr	Course Category/s	Learning Scheme					Credits	Assessment Scheme													
				Actual Contact Hrs./Week			SLH	NLH		Paper Duration	Theory				Based on LL & TL				Based on SL				Total Marks
															Practical								
				CL	TL	LL	FA-TH	SA-TH			Total		FA-PR		SA-PR		SLA						
													Max	Min	Max	Min	Max	Min	Max	Min			
314014	USER INTERFACE DESIGN	UID	DSC	1	-	4	1	6	3	-	-	-	-	-	25	10	25@	10	25	10	75		

Total IKS Hrs for Sem. : 0 Hrs

Abbreviations: CL- Classroom Learning , TL- Tutorial Learning, LL-Laboratory Learning, SLH-Self Learning Hours, NLH-Notional Learning Hours, FA - Formative Assessment, SA -Summative assessment, IKS - Indian Knowledge System, SLA - Self Learning Assessment

Legends: @ Internal Assessment, # External Assessment, *# On Line Examination , @\$ Internal Online Examination

Note :

1. FA-TH represents average of two class tests of 30 marks each conducted during the semester.
2. If candidate is not securing minimum passing marks in FA-PR of any course then the candidate shall be declared as "Detained" in that semester.
3. If candidate is not securing minimum passing marks in SLA of any course then the candidate shall be declared as fail and will have to repeat and resubmit SLA work.
4. Notional Learning hours for the semester are (CL+LL+TL+SL)hrs.* 15 Weeks
5. 1 credit is equivalent to 30 Notional hrs.
6. * Self learning hours shall not be reflected in the Time Table.
7. * Self learning includes micro project / assignment / other activities.

V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT

Sr.No	Theory Learning Outcomes (TLO's)aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
1	TLO 1.1 Explain design thinking concepts. TLO 1.2 Define User Interface. TLO 1.3 Describe User experience.	Unit - I Design Thinking Fundamentals 1.1 Introduction to Design thinking – Concept, Purpose, 5 stages of design thinking – Empathize, Define, Ideate, Prototype, Test 1.2 Introduction to User Interface / User Experience (UI/UX) – Definition of Design with respect to digital media, User Interface, User experience, Difference between UI and UX. History of UX. Need of UI and UX	Chalk-Board Demonstration Presentations Flipped Classroom
2	TLO 2.1 Explain research methods for user requirements. TLO 2.2 Describe requirement analysis techniques. TLO 2.3 Identify user persona.	Unit - II User Requirements and its Analysis 2.1 Introduction to research and analysis tool (freeware) such as FigJam 2.2 User requirements – Definition, Types of user research - Qualitative research, Quantitative research. Tools to collect user requirements – personal observation, interviews, questionnaire, User/ Expert reviews 2.3 User requirement analysis - Understanding target audience and client requirements, Competitive analysis, Affinity mapping, Defining User Persona	Chalk-Board Case Study Demonstration Hands-on Presentations

Sr.No	Theory Learning Outcomes (TLO's) aligned to CO's.	Learning content mapped with Theory Learning Outcomes (TLO's) and CO's.	Suggested Learning Pedagogies.
3	TLO 3.1 Demonstrate storyboarding for given problem. TLO 3.2 Demonstrate User journey mapping for given problem. TLO 3.3 Describe graphic design principles. TLO 3.4 Explain visual communication.	Unit - III User Interface Design 3.1 Storyboarding, User journey mapping 3.2 Gestalt principles of design - Aesthetics in UI design - Using Light, Color and Contrast Effectively in UI Design 3.3 Introduction to any freeware design tool such as Figma 3.4 Visual Communication Design - effective visual communication for graphical user interface	Chalk-Board Demonstration Hands-on Presentations
4	TLO 4.1 Explain User Experience design. TLO 4.2 Describe steps to create gamification techniques. TLO 4.3 Describe steps to create micro-animation. TLO 4.4 Write steps to create interactions using buttons, navigations etc. in any design tool.	Unit - IV User Experience Design Tool 4.1 Introduction to User Experience design 4.2 UX design open source tool such as - Figma features – Navigations, interactions, Buttons Creating library 4.3 Gamification, micro-animation 4.4 Creating visual identity of the project – design system, design theme	Chalk-Board Demonstration Hands-on Presentations
5	TLO 5.1 Create low fidelity prototyping of design on paper. TLO 5.2 Create medium fidelity prototype on paper. TLO 5.3 Write steps to create high fidelity prototype using design tool. TLO 5.4 Test the design prototype.	Unit - V Prototyping and Testing 5.1 Introduction to Wireframing - Purpose of wireframing, Types – low fidelity, medium fidelity, high fidelity 5.2 Basics of sketching, Creating low fidelity wireframes, medium fidelity and high fidelity in Figma 5.3 Basic considerations in wireframing – device, size, behavior, interaction 5.4 Elements used in wireframing – visual design, high fidelity elements 5.5 Prototyping and Testing	Chalk-Board Demonstration Hands-on Presentations

VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL / TUTORIAL EXPERIENCES.

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 1.1 Identify categories of website/ App such as government / e-commerce / tourism related etc. LLO 1.2 Compare different websites/ Apps under one category for design aesthetics. LLO 1.3 Use design tool to collect user requirements. LLO 1.4 Record observations using any design tool.	1	*Use Design tool for user requirement collection and analysis • Visit minimum 5 websites/ Apps of the particular category. Identify problems in overall navigation, look and feel of websites, relevance of the information. Record all findings using Design tool	4	CO1 CO2

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 2.1 Observe various interfaces used in kiosk based applications. LLO 2.2 Prepare affinity mapping of User Requirements using design tools.	2	Use Design tool for user requirement collection and analysis of various interfaces such as kiosks • Visit minimum 5 interfaces. Identify problems in overall navigation, look and feel of the interface, relevance of the information. Record all findings using Design tool	4	CO1 CO2
LLO 3.1 Use any Design tool to create a 'blank project'. LLO 3.2 Use frame, shape, text of design tool to create screen layout of given user interface.	3	*Recreate a given user interface using any open source design tool (For example, to recreate the first screen of personal mobile phone etc.)	4	CO1 CO2 CO3
LLO 4.1 Use frames, images, and colors to design given screen. LLO 4.2 Explore various plug-ins/ extensions in the design tool. LLO 4.3 Use different plug-ins/extensions in design tool.	4	* Create grid system for the given screen using any design tool (For example dashboard of particular application/ welcome screen of any blog portal etc.)	4	CO3 CO4 CO5
LLO 5.1 Use frames, components, auto-layouts to design given screen using Design tool. LLO 5.2 Create asset using design tool. LLO 5.3 Create library/repository of created assets in the design tool.	5	*Design given user interface using various components such as auto-layouts in the design tool (For example, design sample login page/ design registration form etc.)	4	CO2 CO3 CO4 CO5
LLO 6.1 Use horizontal scrolling component in the design tool to create given page(s).	6	*Use horizontal scrolling to create pages for given website/ App (For example, page(s) in social media Apps/ tourism related webpage(s))	4	CO4
LLO 7.1 Use vertical scrolling component in the design tool to create given page(s).	7	*Use vertical scrolling for a given website/ App (For example, Retail website/App or food ordering Apps etc.)	4	CO4
LLO 8.1 Use frame, shape, text tools, components of the design tool to replicate the design of given web page(s). LLO 8.2 Use interactions, menus to replicate web page design.	8	Recreate given website for UI design, color, images, interactions, menu	4	CO3 CO4 CO5
LLO 9.1 Use various menus - bottom menu, slide menu to demonstrate navigations in the screen.	9	*Create navigations for the given website/ App (For example, create navigation in App using bottom menu etc.)	4	CO4
LLO 10.1 Use components and navigations to design quiz like page in design tool.	10	Design a quiz for given user interface (For example, quiz for LMS / government web site / retail web sites etc.)	4	CO5

Practical / Tutorial / Laboratory Learning Outcome (LLO)	Sr No	Laboratory Experiment / Practical Titles / Tutorial Titles	Number of hrs.	Relevant COs
LLO 11.1 Observe gamification techniques used in existing user interfaces. LLO 11.2 Use files, templates to create gamification effect in given scenario using design tool.	11	Create any two gamification effects for given user interface in given scenario (For example, racing effect etc.)	4	CO3 CO4
LLO 12.1 Use files, templates to create gamification effect in given scenario using design tool.	12	Create gamification for task completion in website such as LMS/ retail website/ banking website (For example, popping up effect/ releasing balloons in the air etc. once a task is completed)	4	CO3 CO4 CO5
LLO 13.1 Observe micro-animations used in existing websites, Apps, interfaces. LLO 13.2 Use templates to create micro-animation for given user scenario.	13	Create any five micro animations for the given user interface in given scenario (For example, progress bar effect/ waitin for reply or responce effect/ status bar/ welcome page or opening page animatio etc.)	4	CO3 CO4
LLO 14.1 Use Interactions/ events to create Prototype in design tool.	14	*Create prototyping with different interactions – tab, click, hover, delay. for the given user interface	4	CO4 CO5
LLO 15.1 Use plug-in/ extension to convert the created prototype into html page(s). LLO 15.2 Use browser to run the generated HTML page(s).	15	Convert created prototype in HTML page(s)	4	CO5
Note : Out of above suggestive LLOs - <ul style="list-style-type: none"> • '*' Marked Practicals (LLOs) Are mandatory. • Minimum 80% of above list of lab experiment are to be performed. • Judicial mix of LLOs are to be performed to achieve desired outcomes. 				

VII. SUGGESTED MICRO PROJECT / ASSIGNMENT/ ACTIVITIES FOR SPECIFIC LEARNING / SKILLS DEVELOPMENT (SELF LEARNING)

Micro project

- The micro project has to be Industry Application Based, Internet-based, Workshop-based, Laboratory-based or Field-based as suggested by Teacher:

1. Prepare a prototype for online blog:

- Prepare a competitive analysis of similar website
- Define user persona and prepare user journey mapping using any design tool
- Construct prototype using - navigation, interaction, frames in design tool
- Validate the prototype by checking navigation and conditions given
- Convert the design prototype into HTML code

2. Reconstruct given user interface such as kiosk system:

- Observe the given user interface
- Identify improvement in the user interface in terms of - look and feel, navigation, interactions
- Prepare affinity mapping using design tool
- Reconstruct the given interface using various components in design tool

3. Prepare a prototype for food ordering App:

- a. Prepare a competitive analysis of similar Apps
- b. Define user persona and prepare user journey mapping using any design tool
- c. Construct prototype using - navigation, interaction, frames in design tool
- d. Validate the prototype by checking navigation and conditions given

4. Rebuild smart TV user interface layout

- a. Visit existing interfaces of smart television
- b. Record findings related to color scheme, theme, look and feel, location on display of existing interfaces
- c. Record minimum 10 different user reviews regarding the smart television user interface (chose user from different backgrounds)
- d. Record improvements in look, navigation, and interactions
- e. Redefine user persona for existing interface
- f. Rebuild the interface prototype using design tool

Assignment

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1. Prepare a case-study report -

- a. Identify any dedicated interface such as Automated deposit cum Withdrawal machine.
- b. Perform a user requirement analysis through any research method (e.g. Interview/ Questionnaire etc.).
- c. Define user persona for the same.
- d. Prepare a low fidelity prototype for it.

2. Prepare user storyboard and user journey mapping for given user interface -

- a. Identify user requirements .
- b. Perform a user requirement through research methods (e.g. Interview/ Questionnaire etc.).
- c. Define user persona for the same.
- d. Prepare a user journey mapping for the same.
- e. Prepare a storyboard for the user interface.

3. Prepare low, medium, and high fidelity prototype for given user interface -

- a. Identify user interface.
- b. Collect user requirements by any two methods (e.g. Personal observation/ expert review etc.)
- c. Define user persona for the same.
- d. Prepare a low fidelity prototype on paper for the same.

Other

- Following are some suggestive self-learning topics or any relevant topics suggested by the Teacher:

1. Prepare a feature-based detailed report of similar types of website/portal(such as Flight/ bus Reservation websites/ MIS / e-commerce web sites / educational institutions websites etc).
 2. Prepare affinity mapping in any design tool (e.g. FigJam) for user requirements in given domain of the project.
 3. Define user persona and perform requirements mapping using design tools in any of the following category – Ticket booking kiosk/ Online examination system / Quiz App.
 4. Prepare user journey mapping for given scenario in the given project
 5. Prepare low, medium, and high-fidelity prototypes for a given scenario using any design tool.
 6. Prepare a library/repository of design components using any design tool like Figma.
 7. Reconstruct any ticket booking website to address improvements in look and feel, ease of use within it.
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Note :

- Above is just a suggestive list of microprojects and assignments; faculty must prepare their own bank of microprojects, assignments, and activities in a similar way.
- The faculty must allocate judicious mix of tasks, considering the weaknesses and / strengths of the student in acquiring the desired skills.
- If a microproject is assigned, it is expected to be completed as a group activity.
- SLA marks shall be awarded as per the continuous assessment record.
- If the course does not have associated SLA component, above suggestive listings is applicable to Tutorials and maybe considered for FA-PR evaluations.

VIII. LABORATORY EQUIPMENT / INSTRUMENTS / TOOLS / SOFTWARE REQUIRED

Sr.No	Equipment Name with Broad Specifications	Relevant LLO Number
1	Design tool - preferably open-source based tool such as Figma	All
2	Computer system with minimum specifications as - Processor - 2.9 GHz or equivalents or higher with 10th generation or onwards Operating System - 64 bit RAM - 8GB DDR3 or higher Internet Connectivity	All

IX. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS & ASSESSMENT PURPOSE (Specification Table)

Sr.No	Unit	Unit Title	Aligned COs	Learning Hours	R-Level	U-Level	A-Level	Total Marks
1	I	Design Thinking Fundamentals	CO1	2	0	0	0	0
2	II	User Requirements and its Analysis	CO2	3	0	0	0	0
3	III	User Interface Design	CO3	4	0	0	0	0
4	IV	User Experience Design Tool	CO4	3	0	0	0	0
5	V	Prototyping and Testing	CO5	3	0	0	0	0
Grand Total				15	0	0	0	0

X. ASSESSMENT METHODOLOGIES/TOOLS**Formative assessment (Assessment for Learning)**

- 1. Continuous assessment based on process and product related performance indicators.
Each practical will be assessed considering:
60% weightage to process
40% weightage to product
- 2. A continuous assessment based term work

Summative Assessment (Assessment of Learning)

- End semester examination, Lab performance, Viva voce

XI. SUGGESTED COS - POS MATRIX FORM

Course Outcomes (COs)	Programme Outcomes (POs)							Programme Specific Outcomes* (PSOs)		
	PO-1 Basic and Discipline Specific Knowledge	PO-2 Problem Analysis	PO-3 Design/ Development of Solutions	PO-4 Engineering Tools	PO-5 Engineering Practices for Society, Sustainability and Environment	PO-6 Project Management	PO-7 Life Long Learning	PSO-1	PSO-2	PSO-3
CO1	2	1	2	1	-	1	1			
CO2	3	2	2	2	-	-	2			
CO3	3	3	3	3	1	-	1			
CO4	2	3	3	3	2	1	1			
CO5	2	3	3	3	2	2	1			

Legends :- High:03, Medium:02,Low:01, No Mapping: -
 *PSOs are to be formulated at institute level

XII. SUGGESTED LEARNING MATERIALS / BOOKS

Sr.No	Author	Title	Publisher with ISBN Number
1	Jesse James Garrett	The Elements of User Experience: User-Centered Design for the Web and Beyond	New Riders Publishing, 201 West 103 Street, Indianapolis, IN 46290 800-545-5914 ISBN:978-0-321-68368-7
2	Falk Uebernickel, Li Jiang, Walter Brenner, Britta Pukall, Therese Naef	Design Thinking: The Handbook	World Scientific Publishing Co Pte Ltd, No.16, South West Boag Road T. Nagar, Chennai 600017, INDIA ISBN-10: 9811203504 ISBN-13: 978-9811203503
3	Fabio Staiano	Designing and Prototyping Interfaces with Figma	Packt Publishing Ltd, Grosvenor House, 11 St Paul's Square, Birmingham, B3 1RB ISBN-10: 180056418X ISBN-13: 978-1800564183
4	Kilian Langenfeld	Design Thinking for Beginners	Personal Growth Hackers ISBN-10: 3967160629 ISBN-13: 978-3967160628

XIII. LEARNING WEBSITES & PORTALS

Sr.No	Link / Portal	Description
1	https://aim.gov.in/pdf/Design_Thinking.pdf	Design thinking phases and learning resources
2	https://www.ideou.com/pages/design-thinking-resources	Design thinking resources
3	https://www.figma.com/resource-library/what-is-design-thinking/	Design thinking and its stages
4	https://www.figma.com/resource-library/what-is-ui-design/	Key elements of UI design
5	https://youtu.be/-wzNTPXVIyM?si=zET5z3GpIPl-cAry	User Experience and research methods

Sr.No	Link / Portal	Description
6	https://youtu.be/XT152i5asdQ?si=jPdLFFExnaZO8NRs	User Experience and research methods
7	https://usabilitypost.com/2008/08/14/using-light-color-and-contrast-effectively-in-ui-design/	Using Light, Color and Contrast Effectively in UI Design
8	http://web.cs.wpi.edu/~matt/courses/cs563/talks/smartin/int_design.html	Effective Visual Communication for Graphical User Interfaces
9	https://youtu.be/Y9ixRTTx5iU?si=vSCsbCr6gXD5eG-n	Visual Communication Design
10	https://youtu.be/K-DRTBMnzm8?si=DaUPM4iLW2CU3oSU	Low fidelity design
11	https://youtu.be/KCYLE78w074?si=xZsvSnO9qx7iVE2S	High fidelity design
12	www.figma.com	Figma - Design Tools - Figma and FigJam (Freeware)
13	https://www.figma.com/resource-library/design-basics/	Design basics using Figma (Freeware)
14	https://wireframe.cc/	Single-page, public wireframe without user account available in free version.
15	https://drive.google.com/file/d/1Od0G1mtlRH5LkxgT3GPr7wDEIw7GV05/view	Design Thinking and user experience research (Notes by NPTEL)
16	https://www.mindmeister.com/	Collaborative mind mapping tool
17	https://miro.com/	UX tool
18	https://www.hotjar.com/	UIUX tool
Note : <ul style="list-style-type: none"> Teachers are requested to check the creative common license status/financial implications of the suggested online educational resources before use by the students 		