

## Lesson Plan

*Teacher-in-Charge: Ms. Roshni Padate*

<b>Class</b>		<i>BE (Computer Engineering) Semester VIII</i>	
<b>Academic term</b>		Jan – May 2020	
<b>Subject</b>		<i>Human Machine Interaction</i>	
<b>Subject Code</b>		<i>CSC 801 CSL 801</i>	
<b>No of Students</b>		<i>78</i>	
<b>Periods (Hours) per week</b>	<b>Lecture</b>	<i>4</i>	
	<b>Practical</b>	<i>2</i>	
	<b>Tutorial</b>	<i>--</i>	
<b>Evaluation System</b>		<b>Hours</b>	<b>Marks</b>
	Theory examination	3	80
	Internal Assessment	1+1	20
	Practical Examination	--	--
	Oral Examination	--	25
	Term work	--	25
	Total	--	150
<b>Time Table (Theory)</b>	<b>Day</b>	<b>Time</b>	
	Tuesday	9.45 – 10.45 am	
	Wednesday	9.45 – 10.45 am	
	Thursday	8.45 – 9.45 am	
	Friday	8.45 – 9.45 am	
<b>( Practicals)</b>	Tuesday	11 am – 1.00 pm (B Batch)	
	Tuesday	11 am – 1.00 pm (A Batch)	
	Wednesday	11 am – 1.00 pm (C Batch)	
	Thursday	11 am – 1.00 pm (D Batch)	

<b>Course Content and Lesson plan: Human Computer Interaction</b>					
<b>Module 1 FOUNDATIONS OF HMI:</b>					
01	Lecture No.	Date		Topic	Remarks(If any)
		Planned	Actual		
1.1	1	07/01/2020	07/01/2020	The Human: History of User Interface Designing, I/O channels, Hardware, Software and Operating environments,	
	2	08/01/2020	08/01/2020	The Psychopathology of everyday Things,	
	3	09/01/2020	09/01/2020	Psychology of everyday actions.	
1.2	4	14/01/2020	14/01/2020	Reasoning and problem solving .	
	5	15/01/2020	15/01/2020	The computer: Devices, Memory, processing and networks	
	6	16/01/2020	16/01/2020	Interaction: Models, frameworks, Ergonomics, styles, elements, interactivity, Paradigms	
	7	16/01/2020	16/01/2020		Student Seminars
<b>Module 2 : DESIGN &amp; SOFTWARE PROCESS:</b>					
2.1	8	17/01/2020	17/01/2020	Mistakes performed while designing a computer system,	
	9	21/01/2020	21/01/2020	Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds.	
	10	22/01/2020	22/01/2020	Human interaction with computers, importance of human characteristics human consideration, Human interaction speeds.	
	11	23/01/2020	23/01/2020	Interactive Design basics, process, scenarios, navigation, Iteration and prototyping	
	12	24/01/2020	24/01/2020	HMI in software process: software life cycle, usability engineering	
2.2	13	28/01/2020	28/01/2020	Prototyping in practice, design rationale.	
	14	29/01/2020	29/01/2020	Design rules: principles, standards, guidelines, rules. Recognize the goals,	
	15	30/01/2020	30/01/2020	Goal directed design process.	

	16	31/01/2020	31/01/2020	Evaluation Techniques: Universal Design.	
	17	04/02/2020	04/02/2020		Student Seminar
<b>Module 3: GRAPHICAL USER INTERFACE:</b>					
3.1	18	05/02/2020	05/02/2020	The graphical User Interface: Popularity of graphics, the concept of direct manipulation, graphical systems,	
	19	06/02/2020	06/02/2020	Popularity of graphics, the concept of direct manipulation, graphical systems	
	20	07/02/2020	07/02/2020	Popularity of graphics, the concept of direct manipulation, graphical systems	
	21	11/02/2020	11/02/2020	Characteristics. Web user	
3.2	22	12/02/2020	12/02/2020	Interface: Interface popularity, characteristics	
	23	13/02/2020	13/02/2020	The merging of graphical Business systems and the Web	
3.3	24	14/02/2020	14/02/2020	Principles of user interface design.	
	25	25/02/2020	25/02/2020		Seminar
	26	25/02/2020	25/02/2020		Seminar
<b>Unit Test 1</b>					
<b>Module 4: SCREEN DESIGNING:</b>					
4.1	27	03/03/2020		Design goals , Screen planning and purpose,	
	28	04/03/2020		Organizing screen elements, ordering of screen data and Content , screen navigation and flow,	
	29	05/03/2020		Organizing screen elements, ordering of screen data and Content , screen navigation and flow,	
4.2	30	06/03/2020		Visually pleasing composition, amount of Information, focus and emphasis, presentation	
	31	10/03/2020		Information simply and meaningfully	
	32	11/03/2020		Information retrieval on web, statistical graphics, Technological Consideration in interface design.	

<b>Module 5: INTERFACE DESIGN FOR MOBILE DEVICES:</b>					
	33	12/03/2020		Mobile Ecosystem: Platforms,	
	34	13/03/2020		Application frameworks: Types of Mobile Applications: Widgets, Applications, Games, ,	
	35	18/03/2020		Application frameworks: Types of Mobile Applications: Widgets, Applications, Games, ,	
	36	20/03/2020		Mobile Information Architecture, Mobile 2.0	
	37	24/03/2020		Mobile Design: Elements of Mobile Design, Tools.	
	38	25/03/2020			Seminar
	39	26/03/2020			Seminar
	40	27/03/2020			Seminar
<b>Module 6: INTERACTION STYLES AND COMMUNICATION:</b>					
	41	31/03/2020		Windows :Characteristics, Components, Presentation styles,	
	42	01/04/2020		Types of Windows, Management, operations. Text messages:	
	43	02/04/2020		Words, Sentences, messages and text words,	
	44	03/04/2020		Text for web pages. Icons, Multimedia and colors	
	46	01/04/2020			Seminar
	47	02/04/2020			Seminar
	48	03/04/2020			Seminar

**Course Objectives:** At the end of the course, students will be able to

1. Learn the foundation of human machine interaction.
2. Understand the importance of human psychology in designing good interfaces.
3. Be aware of mobile interaction design and its usage-in day to day activities.
4. Understand various design technologies to meet user requirements.
5. Encourage to indulge into research in Machine Interaction Design.

- Course Outcomes:** At the end of the course, the students will be able to -
- CSC801.1 Identify User Interface (UI) design principles.(Apply)
  - CSC801.2 Analysis of effective user friendly interfaces. (**Evaluate**)
  - CSC801.3 Apply Interactive Design process in real world applications.(Apply)
  - CSC801.4 Evaluate UI design and justify. (**Evaluate**)
  - CSC801.5 Create application for social and technical task.(Apply)

### Mapping of CO and PO/PSO

Relationship of course outcomes with program outcomes: Indicate 1 (low importance), 2 (Moderate Importance) or 3 (High Importance) in respective mapping cell.

	PO1 (Engg Know)	PO2 (Ana)	PO3 (De sign)	PO4 (inve stiga)	PO5 (tools)	PO6 (engg Soci)	PO7 (Env)	PO8 (Eth)	PO9 (ind Team)	PO10 (comm.)	PO11 (PM)	PO12 (life Long)
CSC801.1	2	2	3		3							
CSC801.2	2	2										
CSC801.3	2	2	3		3							
CSC801.4	2	2	3		3	2						
Total	8	8	9		9	2						
CO –PO Matrix	2	2	3		3	2						

CO	PSO1	PSO2
CSC801.1	3	
CSC801.2	2	
CSC801.3	3	2
CSC801.4	3	2
CO-PO Matrix	2.75	2

### **CO assessment tools**

CSC801.1 Identify User Interface (UI) design principles.

Direct Methods (80%): (T1) + A + P + End sem

**CO1dm = 0.2T + 0.2A + 0.3Lab + 0.2UTh + 0.1UPr.**

Indirect Method (20%): Survey

CSC801.2 Analysis of effective user friendly interfaces.

Direct Methods (80%): T1 + A + End sem

**CO2dm = 0.3T + 0.4A + 0.2UTh + 0.1UPr**

Indirect Method (20%): Survey

CSC801.3 Apply Interactive Design process in real world applications.

Direct Methods (80%): T2 + P + A + End sem

**CO3dm = 0.2T + 0.2Lab + 0.3A + 0.2UTh + 0.1UPr**

Indirect Method (20%): Survey

CSC801.4 Apply Interactive Design process in real world applications.

Direct Methods (80%): T2 + P + A + End sem

**CO3dm = 0.2T + 0.2Lab + 0.3A + 0.2UTh + 0.1UPr**

Indirect Method (20%): Survey

CSC801.5 Evaluate UI design and justify.

Direct Methods (80%): 0.7P + 0.2 UTh + 0.1 UPr

Indirect Method (20%): Survey

### **Course outcomes Target:**

**CSC801.1 : 2.7**

**CSC801.2 : 2.7**

**CSC801.3 : 2.5**

**CSC801.4 : 2.7**

### **Previous Year's CO attainment:**

CO	Description	2018-19	2017-18	2016-17
CPC801.1	Design user centric interfaces	2.52	2.36	2.52
CPC801.2	Apply HMI principles in their day-to-day activities	2.76	2.2	2.2
CPC801.3	Criticize existing interface designs, and improve them	2.04	2.2	2.36
CPC801.4	Develop interactive products up to the prototype stage for social and technical task.	2.76	2.52	2.84

### **Content Beyond Syllabus:**

1. One study assignment on advance topic in HMI
2. Guest Lecture that covered few case studies in HCI

### **Curriculum Gap:**

1. Some of the advance HMI techniques such as Data gloves, Brain computer interface etc. have not been discussed in the syllabus. Students need to understand how these advance HMI techniques are practically applied in the real world applications. To bridge this gap, students have been given one study assignment in which they have to prepare a detailed report on any one advance topic in HMI that is not covered in the syllabus.
2. Also to keep the students updated with the recent advancements in HMI, students will study one recent publication / technical in the field of HMI and present it in front of the class. This exercise will help inculcate lifelong learning in students.

### **Rubrics for the Lab Experiments:**

<b>Performance Indicator</b>	<b>BS- Below standard</b>	<b>MS- Meets Standard</b>	<b>ES – Exceeds Standard</b>
<b>Contextual Inquiry (2)</b>	Does not have any idea about the client or existing applications (0)	Research on existing Applications done. Does not give too much importance to the particular client/ user (1)	Research on the users' behavior, interests and their requirements. Has knowledge on such existing applications (2)
<b>Design of user interfaces (2)</b>	Design is not tied to findings from Contextual Inquiry, or other research (0)	Most aspects of the design are tied to contextual findings and research. (1)	Design is completely tied to contextual Inquiry, and research (2)
<b>Follows HMI design principles(Visually pleasing composition, logical navigation, use of proper color, focus, grouping, contrast (2)</b>	None of the design principles followed. Interface is difficult to use because of demands on memory, learning, or the visual/ auditory /motor system (0)	Applied few of the design principles. Interface does not place much load on memory, learning, or the visual/auditory/motor system (1)	Understood and applied all the general design principles. Overall the design is good and innovative. (2)

<b>Test Cases and conclusion</b> (2)	Usability test not been conducted (0)	Usability test conducted and derived appropriate conclusion from the test (1)	Usability test conducted with all the design aspects covered during the test and derived appropriate conclusion.(2)
<b>Post Lab Assignment</b> (2)	Answers are irrelevant to the question or the problem(0)	Basic points have been covered but not in detail (1)	Basic points covered with appropriate justification (2)

### List of Lab Experiments

Sr. No.	Topic	Experiment	CO
1	Know the clients (Design any one of the applications listed)	<p>a. Children (4-5 years of age): An application to teach math/english.</p> <p>b. Teenagers: Design a digital diary for young teens to help them overcome various social pressures they deal with during their teen years. The diary should also be like a self help tool which would help them deal with incidents like bullying, peer pressure, etc. This is an open project and you can think in any direction to make the children sail through their teen years while trying to discover life around them.</p> <p>c. Older generation: Folks from the older generation has been very wary of using their credit card on the Internet. They have various concerns when it comes to paying their bills. Also because of their old age, it will be beneficial for them to use the internet and pay their phone, electricity, gas, etc. bills</p> <p>d. Rural people: ATVM for train ticketing in rural area</p>	1,4
2	Know the user/client	Developing an interface for an application for Physically or visually challenged people	1,2,4
3	Requirement Gathering Technique	Design story boards from any two scenarios for any software system.	1
4	Understand the trouble of interacting with machines	Redesign interfaces of home appliances like microwave oven, land- line phone, fully automatic washing machine.	1,3,4
5	Learn HMI design principles – heuristic evaluation	Identify 5 different websites catering to one specific goal (eg. Goal – on-line shopping and 5 different websites – ebay, amazon, flipkart, zovi, myntra) and perform a competitive analysis on them to understand how each one caters to the goal, the interactions and flow of the payment system and prepare a report on the same	1,3

6	Learn the importance of menus and navigation	Website redesign: News websites like CNN are always cluttered with information. It takes the user a few minutes to find his way through and maybe more minutes to look for some specific information. Redesign the news websites to make it look less cluttered, provide relevant information (a person sitting in Russia should not get US news as top news), intelligently dig Information that he might be interested in based on his searches on the web.	1,3,4
7	Icon designing	Choose a unique domain, design a few icons and show how it can be accommodated on an interface	1
8	Study of Serial Positioning effect, Webber's Law, Fitt's Law	To study serial Positioning effect, Fitt's law and Webber's law. (Use IIT's Virtual labs) <b>(New)</b>	1,2
9	Understand the various input methods available for interaction	Concept generation: Study the various technologies for typing – standard keyboards QWERTY, T9 (predictive text), multi-touch (SYWPE, etc.), gestures and brainstorm on the various ways in which you could improve one of the existing technologies. You could choose any of the different input types	
10	Study of advance HMI topic	To study advance topic in HMI that is not covered in syllabus and prepare a report for the same.	PO12
11	Technical paper presentations	study one recent publication / technical in the field of HMI and present it in front of the class. This exercise will help inculcate lifelong learning in students.	PO12

Sr. No.	Title of Experiments
1	Problem representation for Designing User Interface
2	Design a Mobile app/ Website that can teach mathematics to children of 4-5 years age in schools in Rural /Urban Sector
3	Design a Mobile App/Website that can help people to sell their handmade products in metro cities
4	ATM machine/KIOSK screen design for rural people.
5	Design a Mobile App/Website to get an experience for passengers whose flight /train is delayed.
6	Design an UI application for Institute event management.
7	Design of User interface for the system using various interaction styles.
8	Statistical Graphics and its use in visualization
9	Design appropriate icons pertaining to a given domain .(Eg. Greeting cards)

## **Assignments Rubrics for evaluation:**

### **Rubrics for Evaluation of Assignment1:**

Indicator	Unsatisfactory	Satisfactory	Good	Excellent	Marks
Level of content (4)	Major points are omitted or addressed minimally (1)	All major topics are covered, the information is accurate(2)	Most major and some minor criteria are included. Information Is accurate (3)	All major and minor criteria are covered and are accurate. (4)	
Organization (4)	Very poor readability and not structured (1)	Poor readability and somewhat structured (2)	Good Readability and structured(3)	Very well written and structured (4)	
Support of relevant Diagrams and Examples (2)	No use of diagrams or any example to explain the answer (0.5)	Some of the answers are supported by diagrams and examples (1)	Most answers are supported by examples and diagrams (1.5)	All answers are supported with diagrams and appropriate examples where ever needed (2)	
Total					

### **Rubrics for Evaluation of Assignment2:**

Indicator	Unsatisfactory	Satisfactory	Good	Excellent
Design of interface (4)	Poor design , does not follow HMI guidelines (1)	Follows HMI principles and guidelines and design is satisfactory (2)	Good design. Applies HMI principles and guidelines. (3)	Understood and applied all the general design principles. Overall the design is good and innovative (4)
Improvement in existing design (4)	No improvement in existing design (1)	Few improvements suggested(2)	New design removes many flaws present in existing design (3)	New design is excellent and innovative (4)
Support of relevant Diagrams and Examples (2)	No use of diagrams or any example to explain the answer (0.5)	Some of the answers are supported by diagrams and examples (1)	Most answers are supported by examples and diagrams (1.5)	All answers are supported with diagrams and appropriate examples where ever needed (2)

**Rubrics for Evaluation of Assignment3:**

<b>Performance Indicator</b>	<b>Unsatisfactory</b>	<b>Satisfactory</b>	<b>Good</b>
<b>Contextual Inquiry (3)</b>	Does not have any idea about the client or existing applications (1)	Research on existing Applications done. Does not give too much importance to the particular client/ user (2)	Research on the users' behavior, interests and their requirements. Has knowledge on such existing applications(3)
<b>Design of user interfaces (4)</b>	Design is not tied to findings from Contextual Inquiry, or other research. (1-2)	Most aspects of the design are tied to contextual findings and research. (3)	Design is completely tied to contextual Inquiry, and research (4)
<b>Follows HMI design principles (3)</b>	None of the design principles followed. Interface is difficult to use because of demands on memory, learning, or the visual/auditory/ motor system.(1)	Applied few of the design principles. Interface does not place much load on memory, learning, or the visual/auditory/motor system. (2)	Understood and applied all the general design principles. Overall the design is good and innovative. (3)

**Text Books:**

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, "Human Computer Interaction", 3rd Edition, Pearson Education, 2004.
2. Wilbert O. Galitz, "The Essential Guide to User Interface Design", Wiley publication.
3. Alan Cooper, Robert Reimann, David Cronin, "About Face3: Essentials of Interaction design", Wiley publication.
4. Jeff Johnson, "Designing with the mind in mind", Morgan Kaufmann Publication.
5. Donald A. Normann, " Design of everyday things", Basic Books; Reprint edition 2002.
6. Brian Fling, "Mobile Design and Development", First Edition , O'Reilly Media Inc., 2009.

**Reference Books:**

1. Rogers Sharp Preece, "Interaction Design: Beyond Human Computer Interaction", Wiley.
2. Guy A. Boy "The Handbook of Human Machine Interaction", Ashgate publishing Ltd.
3. Kalbnde, Kanade, Iyer, "Galitz's Human Machine Interaction", Wiley Publications.

**Assessment:**

**Internal Assessment:**

Assessment consists of two class tests of 20 marks each. The first class test is to be conducted when approx. 40% syllabus is completed and second class test when additional 40% syllabus is completed. Duration of each test shall be one hour.

**End Semester Theory Examination:**

1. Question paper will comprise of 6 questions, each carrying 20 marks.
2. The students need to solve total 4 questions.
3. Question No.1 will be compulsory and based on entire syllabus.
4. Remaining question (Q.2 to Q.6) will be selected from all the modules.

**Oral Examination:**

Oral Examination should be or 25 Marks must be based on the syllabus

**Course exit survey:**

Sr. No	Question	Strongly agree	Agree	Disagree	Strongly Disagree
1	Rate your ability to Identify User Interface (UI) design principles.				
2	Rate your ability to Analysis of effective user friendly interfaces.				
3	Rate your ability to Apply Interactive Design process in real world applications.				
4	Rate your ability to Evaluate UI design and justify.				

**Video Links:**

Sr. No	Title	Link	Source
1	History of HMI	<a href="https://www.youtube.com/watch?v=LJ0sIHj-OWo">https://www.youtube.com/watch?v=LJ0sIHj-OWo</a>	Youtube
2	Norman's Doors	<a href="https://www.youtube.com/watch?v=yY96hTb8WgI">https://www.youtube.com/watch?v=yY96hTb8WgI</a>	Youtube
3	Gulf of evaluation	<a href="https://www.youtube.com/watch?v=bg4UwyPPZ6U">https://www.youtube.com/watch?v=bg4UwyPPZ6U</a>	Youtube
4	Usability Heuristics	<a href="https://www.youtube.com/watch?v=B56Bz3T_aEw">https://www.youtube.com/watch?v=B56Bz3T_aEw</a>	Youtube
5	Contextual Inquiry	<a href="https://nptel.ac.in/courses/106106177/4">https://nptel.ac.in/courses/106106177/4</a>	NPTEL
6	Gestalt Principles	<a href="https://www.interaction-design.org/literature/topics/gestalt-principles">https://www.interaction-design.org/literature/topics/gestalt-principles</a>	Interaction design Foundation
7	Low Fidelity and High Fidelity Prototyping	<a href="https://nptel.ac.in/courses/106106177/13">https://nptel.ac.in/courses/106106177/13</a>	NPTEL