Proposed Academic Structure 2022-23

B.Des Transportation Design

AJEENKYA D Y PATIL UNIVERSITY | THE INNOVATION UNIVERSITY

Section 1: Program Overview

Reputation

1	**Market need** (Brief note highlighting necessity of the Program looking at current market situation) Transportation design is largely concerned with the development of road vehicles. Transportation designers create concepts using sketches and computer-aided design (CAD) programs for the visual appearance, as well as functional performance, of vehicles. Automotive designers spend the majority of their time working in an office but may occasionally work on production floors where their designs are produced. Like for all other industrial and commercial designers, a bachelor's degree is the most common path to employment.
2	**Industry Demand** - Entry Level positions and occupations
3	**Target Industries** – Automotive OEM, Design studios, Manufacturers
4	**Expected Occupation at the Entry Level after completion of course** Junior Designer
5	**Areas of research –** Industrial Design, Transportation Design

6	**Name of the probable higher degree programs which student can enroll after program completion** Masters in Design
8	**Competitive programs at other Universities in India** Bachelor's in Design
8.1	**No of institutes / universities offering similar program** 6
8.2	**2 to 3 leading institutes offering same program** 1. National Institute of Design 2. IDC, IIT Bombay 3. MIT Institute of Design
8.3	**Annual Fees (Rs. In lakhs)** – Rs. 500000

Revenue

1.	**Proposed student strength & expected number of admissions in first year** 100
2.	**Proposed Annual fees (Rs. In lakhs)** Rs. 500000

Resources

Sr. No.	Infrastructure requirement	Year 1	Year 2	Year 3	Year 4
1.	No. of Class rooms	2	2	2	2
2.	No. of Laboratory	1	1	1	1
3.	Area (sq. ft.)	1200	1200	1200	1200
4.	Computer hardware required (No.s)	50	50	50	50
5.	Software required (Rs. In lakhs)	50 lakhs	50 lakhs	50 lakhs	50 lakhs
6.	Any other specified equipments required (Details)	Physical Modelling tools	Clay modelling tools	Clay modelling tools	Clay modelling tools
7.	Faculty requirement (No.s)	7	7	7	7
8.	Any other Infrastructure requirement (Details)	Physical Modelling Workshop	Clay Modelling Lab	Clay Modelling Lab	Clay Modelling Lab

Section 2: Program General Information

Name .	Transportation Design
Level	Bachelor's in Design

Section 3: Program Educational Objectives

Broad goals that address institutional and program mission statements and are responsive to the expressed interests of various groups of program stakeholders.

1. To provide young professionals with the expertise to conceive innovating solutions in designing new generations of vehicles, more in line whit the current and incoming mobility scenario.
2. To provide students with appropriate knowledge and understanding of the latest developments and drivers of design to prepare them for development of their personal, and future professional practice in the work place.
3. To develop knowledge and critical comprehension of the practices of the automotive and transportation designer beyond mere illustration and styling.

4. To encourage innovation, forward thinking, the novel application of new technologies/materials equipping graduates with a lifelong confidence to experiment and resolve problems.
5. To enable students to develop enhanced presentation and communication techniques appropriate to a professional audience.
6. To foster an increasing responsibility in students in self-directed creative work, mirroring design consultancy practice.
7. To foster self-awareness, intellectual integrity and adaptability, and to give students choice, independence and a range of potential career opportunities.
8. To cultivate critical analysis and creative synthesis, self-motivation, intellectual curiosity, speculative enquiry, imagination, and diverse thinking skills.
9. To develop interpersonal skills that enable students to work in teams, as a collaborator, conciliator or leader when interacting with patrons, makers, users and specialist interest groups.
10. To enable students to evaluate conflicting design solutions, to optimise a cost/benefit compromise, the social and environmental impact of their designs and balance these issues with analysis of recognised desirability factors to produce viable and desirable products.
11. To provide learning experience systematically designed to induct individual students into the 'community of practice' of industrial design.
12. To provide a learning experience that fosters personal development in enterprise, team-working and project management.
13. To enable students to respond to self-initiated and developed briefs in transportation design.

Section 4: Program outcomes

The program must then formulate a set of program outcomes (knowledge, skills, and attitudes the program graduates should have) that directly address the educational objectives and encompass certain specified outcomes.

1. Technical skills, perceptual development, and understanding of design and other principles of visual organization sufficient to achieve basic visual communication using one or more media associated with design.

2. Basic ability to demonstrate how relationships among design principles and the material qualities of objects are incorporated into the production of design work, and how they contribute in terms of use and interpretation.

3. Functional knowledge of how the design of communication, products, environments, systems and services both reflects and shapes various aspects of the context in which they are produced.

4. Understanding of the various levels at which design problems can be formulated and addressed and the ability to discern observable or potential consequences of specific design action in large complex systems.

5. Ability to identify differences among audiences/users for design, and an understanding of how audience/user values and behaviors are reflected in the design of communications, products, environments, and services

6. Understanding of design process, including abilities to consider probable or potential future conditions, think divergently in the generation of multiple solutions, and use design principles and elements of the design process to converge on ideas and results that are effective in realizing project purposes

7. Awareness of the critical perspectives in the evaluation of design, including the history of ideas about the role of design in culture and of ideas informing design practice over time

8. The ability to use overview knowledge of design practice, history, theory, criticism, and technology and the tools and techniques of research, scholarship, and communication in the production of scholarly analytical work about design

Section 5: Program benchmarking

Details of the international standards / subject benchmark statements referred and web link for the same.

International standards / subject benchmarks statements referred	URL
Art Center, Pasadena	http://www.artcenter.edu/academics/undergraduate-degrees
Royal College of Art, London	https://www.rca.ac.uk/schools/school-of-design
IIT IDC	www.idc.iitb.ac.in/academics/mobility_&_vehicle_design.html

Section 6: Program Specific outcomes (PSO)

Program Specific Outcomes are what the students should be able to do at the time of graduation with reference to a specific discipline or specialization.

1. Apply knowledge of Brand study, Design Research, User research, conceptualization, Design development, Digital modelling and Clay modelling skills to create new and relevant solutions of automotive and transportation products

2. Identify, Formulate, Research literature and Analyse complex design problems reaching substantiated conclusions using design process, techniques and tools

3. Design solutions for problems in transportation and design system, components or processes that meet specified needs and appropriate considerations for public health and safety, cultural, societal and environmental considerations

4. Apply ethical principles and commit to professional ethics and responsibilities and norms of design practice

5. Function effectively as an individual and as a member or as a leader in diverse teams and in multi-disciplinary settings

6. Recognise the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context of technological change

Section 7: Credit allocation

Bachelor of Design

Sr. No	Legend	Course Basket	Weightage (%)	Credits
1	Studio Courses	SC	52.5	84
2	Art + Design History	ADH	10	16
3	General Studies	GE	25	40
4	Free Electives	FE	12.5	20
5	Minor	MN		18

Credit registration

Unless approved otherwise by the Director of the concerned School, a student will normally not be allowed to register for more than 21 credits in a term. Students must enroll for minimum 12 credits to fulfill the norm of a full time course. 15 credits are normally offered to the students in every term.

Section 8 : Program structure

Legends		
SC: Studio Course	**ADH :** Art, Design, History	**GE :** General Education
FE: Free Electives	**MN :** Minor	

SEM I – 20 Credits								
S. No	**Course Code**	**Course Title**	**Course Type**	**Credits**	**CL**	**ST**	**Total**	**CA/Jury**
1	DN103D	Elementary Sketching and Illustrations	ADH	4	1	5	6	CA & Jury
2	DN101D	Elements of Design	SC	4	4	0	6	CA & Jury
3	DN104D	History of Design	ADH	3	3	0	4	CA & Jury
4	DN105D	Craft Exposure and Creative Art Work	ADH	3	0	5	5	CA & Jury
5	DN102D	Design Overview	SC	2	2	0	8	CA & Jury
6	GEX126	Composition and Rhetorics	GE	3	3	0	4	CA

7	GEX333	Photography and Digital Editing	GE	1	1	1	2	CA

SEM II – 21 Credits								
S. No	**Course Code**	**Course Title**	**Course Type**	**Credits**	**CL**	**ST**	**Total**	**CA/Jury**
1	DN106D	Design Drawing	SC	4	1	5	6	CA & Jury
2	DN107D	3D Form Design	SC	4	0	6	8	CA & Jury
3	DN109D	Art and Aesthetics Appreciation	ADH	1	0	2	1	CA & Jury
4	DN108D	Physical Model Making	SC	4	0	6	3	CA & Jury
6	GEX167	Writing 1	GE	3	3	0	4	CA
7	GID109	Environmental Studies	GE	3	3	0	4	CA
8	GID328	Discipline Introduction	GE	2	1	2	2	CA

SEM III – 24 Credits									
S. No	**Course Code**	**Course Title**	**Course Type**	**Credits**	**CL**	**ST**	**TU**	**Total**	**CA/Jury**
1	TD210D	Automotive Design Drawing	SC	4	1	5	0	6	CA
2	TD211D	Designing Automotive Forms	SC	4	0	6	0	6	CA&Jury
3	PD213D	Design Research and Information Synthesis	SC	2	1	2	0	3	CA
4	TD212D	Digital Rendering 1	SC	3	0	5	0	5	CA
5	PD212D	Materials and Processes 1 (Metals)	SC	1	1	0	0	1	CA
6	GLO111	History of Automobile Design	ADH	2	2	0	0	2	CA
7	GEX 174	Writing II	GE	3	3	0	0	3	CA
8	GEX 208	Design Presentation Techniques	GE	2	1	2	0	3	CA
9	FD206D	Free Elective 1 – Footwear Design	FE	3	1	5	0	6	CA
	PD214D	Free Elective 1 – Furniture Design							

SEM IV – 21 Credits									
S. No	**Course Code**	**Course Title**	**Course Type**	**Credits**	**CL**	**ST**	**TU**	**Total**	**CA/Jury**
1	TD213D	Design Studio 1	SC	4	0	6	0	6	CA&Jury
2	TD214D	Vehicle Ergonomics and Packaging	SC	3	1	4	0	4	CA
3	TD215D	Digital Rendering 2	SC	3	0	5	0	5	CA
4	PD216D	Materials & Processes 2 (Plastics + Composites)	SC	2	1	2	0	3	CA
5	GEX 341	General Education – Modern art and Ideas	GE	3	1	3	0	4	CA
6	TD216D	Art, craftmanship & car design	ADH	3	1	4	0		
7	FD213D	Free Elective 2 – Material Craft Technique	FE	3	1	5	0	6	CA
8	PD250D	Free Elective 2 – Design Thinking							
9	TD218D	Free Elective 2 – Concept 3D Modelling							

10.	GRD211	Minor 1 : Indian Design Sensibilities – Study on Indian Thought and Philosophy	MN	3	1	3	0	4	CA
11.	FSD211	Minor 1 : Color, Materials and Finish – Patterns, Textures and Color	MN	4	1	5	0	6	CA

SEM V – 25 Credits									
S. No	**Course Code**	**Course Title**	**Course Type**	**Credits**	**CL**	**ST**	**TU**	**Total**	**CA/Jury**
1	TD310D	Design Studio 2	SC	4	0	6	0	6	CA&Jury
2	TD311D	Digital Modelling 1 (Alias Automotive Basics)	SC	3	0	5	0	5	CA
3	TD312D	Design Studio 3 (Conceptual)	SC	4	1	5	0	6	CA&Jury
4	TD313D	Automotive User Interface	SC	2	2	0	0	2	CA

5	GID464	Introduction to Automotive Technologies	GE	2	2	0	0	2	CA
6	GIN269	Design Competition	GE	1	0	2	0	2	CA
6	GID462	General Education – Empathy in Design Thinking	GE	3	1	3	0	4	CA
7	GEX135	Portfolio I	GE	1	1	0	0	1	CA
8	VC320D	Free Elective 3 – Storytelling and Presentation Technique	FE	4	1	5	0	6	CA
9	PD330D	Free Elective 3 – Circular Economy							
10	UX328D	Free Elective – Designers Toolbox	FE	1	0	2	0	2	CA
				25					

9.	GRD212	Minor 2 : Indian Desing Sensibilities – Study Trips, Indian Design Documentation	MN	3	1	3	0	4	CA
10.	FSD212	Minor 2 : Color, Materials and Finish – Color Fundamentals	MN	2	1	2	0	3	CA

SEM VI – 24 Credits									
S. No	**Course Code**	**Course Title**	**Course Type**	**Credits**	**CL**	**ST**	**TU**	**Total**	**CA/Jury**
1	TD314D	Design Studio 4 (2 wheelers)	SC	5	0	10	0	10	CA&Jury
2	TD315D	2 Wheeler Sketching & Rendering	SC	3	1	4	0	5	CA
3	TD318D	Design Project (Research)	GE	3	0	5	0	5	CA&Jury
4	TD317D	3D CAS Advanced (Alias Automotive)	SC	3	0	5	0	5	CA
5	GEX309	Portfolio 2	GE	1	1	0	0	1	CA
6	GLO150	Design Reviews	GE	2	1	2	0	3	CA

7	GIN250	General Education – Innovation Through Design	GE	3	1	3	0	4	CA
8	TD320D	Free Elective 4 – AI in Design : Application and Ethics	FE	4	1	5	0	6	CA
9	PD320D	Free elective 4 – Intellectual Property Rights							

9	**GRD213**	**Minor 3 : Indian Design Sensibilities – Research Project**	**MN**	**4**	**1**	**5**	**0**	**6**	**CA**
10	**FSD213**	**Minor 3 : Color, Materials and Finish – Fabric Study**	**MN**	**3**	**1**	**3**	**0**	**4**	**CA**

SEM VII – 16 Credits									
S. No	**Course Code**	**Course Title**	**Course Type**	**Credits**	**CL**	**ST**			
1	TD409D	Design Studio 5	SC	4	0	6			
2	TD402D	Trend Analysis and Forecasting	SC	2	2	0			
3	TD407D	Product Planning and Strategic Branding	GE	2	2	0			
5	GLO231	General Education – Design Management and Professional Practice	GE	4	2	3	0	5	CA
6	UX424D	Free elective 5 – Research Paper Writing	FE	4	1	5	0	6	CA
	FD407D	Free elective 5 - Entrepreneurship							

8	**GRD214**	**Minor 4 : Indian Design Sensibilities – Exploration Project**	**MN**	**4**	**1**	**5**	**0**	**6**	**CA**

9	**FSD214**	**Minor 4 : Color, Materials and Finish – Digital Rendering**	**MN**	**4**	**1**	**3**	**0**	**4**	**CA**

SEM VIII – 15 Credits									
S. No	**Course Code**	**Course Title**	**Course Type**	**Credits**	**CL**	**ST**	**TU**	**Total**	**CA/Jury**
1	TD411D	Internship/Degree Project	SC	12	0	18	0	18	CA&Jury
2	GEX336	Project Documentation & Presentation	GE	3	2	3	0	5	CA

8	GRD215	Minor 5 : Indian Design Sensibilities – Final Project	MN	4	1	5	0	6	CA
9	FSD215	Minor 5 : Color, Materials and Finish – Design Project	MN	5	1	8	0	9	CA

Total Program course distribution

Course category	Credits	Courses
GE: General Education Course	45	19
SC: Studio Courses	86	24
FE: Free Electives	19	6
ADH: Art and Design History	16	6
MN: Minor	18	5

Total Program credit distribution

Sr. No	Year	Semester	Credits assigned
1	FIRST	I	19
2		II	23
3	SECOND	III	21
4		IV	28
5	THIRD	V	25

6		VI	27
7	FOURTH	VII	22
8		VIII	15
TOTAL –			180

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Section 9: Program core

A set of coures in the program curriculum designated to address the knowledge, skills, and attitudes specified in the outcomes.

Elementary Sketching and Illustrations
Elements of Design 1
Automotive Design Drawing 1
Design Studio I
Automotive Design Drawing 2
Digital Rendering 1
Design Studio 2
Design Studio 3

Design Studio 4
Alias Automotive Basics
Design Project - Research
Alias Automotive Advanced
Design Studio 5
Design Studio 6
Final Thesis Project

Section 10: Course sequence

Sequence of courses attaining a particular curriculum outcome or a sequence of courses attaining a particular specialization. Courses sequences could be more than 3 also. Subjects to be mentioned in a sequential manner.

Sequence I	Sequence II	Sequence III

Specialization Sequence
Design Studio 1
Design Studio 2

Design Studio 3
Design Studio 4
Design Project - Research
Design Studio 5
Design Studio 6
Final Thesis Project

Section 10: Program evaluation matrix

Sr. No	Courses	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Elementary Sketching and Illustrations								3
2	Elements of Design 1				3				
3	History of Design	1		2				3	
4	Physical Modeling Processes					3			

5	Aesthetics and Creative Appreciation	1						2	
6	Photography and Digital Editing								
7	Design Drawing								3
8	Elements of Design 2								
9	Ergonomics						3		
10	System Thinking	3		3					
11	Fundamentals of User Interface Design						3		
12	Craft Exposure and Creative Art Work					3			
13	Automotive Design Drawing 1								3
14	History of Automobiles	1		2				3	
15	Introduction to Automotive Technologies		2			2			
16	Mini Project 1 (Exterior)	3	3	2	3				3
17	Automotive Design Drawing 2								3

18	Automotive Aesthetics	1						2	
19	Digital Rendering								3
20	Mini Project 2 (Interior)	3	3	2	3	2	2	2	3
21	Portfolio 1								
22	Automotive Design Studio 1	3	3	3	3	3	3	3	3
23	Vehicle Packaging		2						
24	Design Research	3	2	3				3	
25	Vehicle Ergonomics		2				3		
26	Automotive Design Studio 2								
27	Automotive User Interface						3		
28	3D CAS Basics (Alias Automotive)								
29	Automotive Materials and Processes					3			
30	Portfolio 2								
31	Design Project 1	3	3	3	3	3	3	3	3
32	Trend Analysis and Forecasting	3	2	3				3	

33	Design Project 2	3	3	3	3			3	3
34	Advance 3D CAS (Alias Automotive)								
35	Design Project 3	3	3	3	3			3	3
36	Portfolio Development								
37	Product Planning and Strategic Branding	3	2	3				3	
38	Final Thesis Project	3	3	3	3	3	3	3	3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

Section 11: Individual course information (To be prepared for all courses)

1	**Course Title**	**Elementary Sketching and Illustrations**
2	**Level**	**1**
3	**Credits**	**4**

4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. Developing a working concept of what it means to draw
2. Reinforcing the principles of traditional drawing skills.
3. Developing new ways of thinking, seeing and creating.
4. Tapping into imagination, intuition and powers of observation by exploring various ways of seeing, both perceptually and conceptually.
5. Building confidence through exercise that help you explore different types techniques

Course Outcome:

1. Skillfully apply the principle techniques, tools, materials, and media employed in manual freehand drawing and illustration.
2. Ability to observe and accurately translate observed subjects or scenes into two-dimensional representations on paper using a variety of drawing techniques such as perspectives and projections.
3. Demonstrate skills in accurately drawing and illustrating a variety of subjects, at a range of scales: at the scale of a portable object, at the scale of furniture, and at the scale of architecture.
4. Demonstrate the fine motor skills and precision in penmanship required in manual freehand drawing and illustration..
5. Recognize and discriminate between the various techniques of manual freehand drawing and illustration.

6. Evaluate and critique one's own drawings and illustrations, or those of one's peers, in terms of technique, media, composition and subject.

Syllabus details

Unit	Details
1	Students will be introduced to the basics of freehand drawing. Through a series of practical exercises students will explore different techniques and tools of drawing. Exercises will be in the form of drawing from observation, including the human figure, the portrait, landscape, still-life, typography and numerous other subjects. Students will develop their skill, perception and appreciation for the technique, the art, and the role of drawing. ● Introduction to tools, instruments, and media ● Quick exercises introduce the themes of the course ● Typography, roman typeface, gothic typeface ● Typographical page composition ● The portrait ● The landscape ● Field trip ● The still-life ● The human figure, static and in motion ● Analytical drawing ● Photorealistic drawing in graphite pencil ● Introduction to orthographic freehand drawing ● Perspective drawing

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.	The Doodle Revolution	Sunni Brown	-

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Developing a working concept of what it means to draw								3
2	Reinforcing the principles of traditional drawing skills.								3
3	Developing new ways of thinking, seeing and creating.								3
4	Tapping into imagination, intuition and powers of observation by exploring various ways of seeing,								3

	both perceptually and conceptually.								
5	Building confidence through exercise that help you explore different types techniques								3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Elements of Design – I**
2	**Level**	**1**
3	**Credits**	**4**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. To develop the understanding towards various Elements Of Design that plays a very important role.

2. Objective is to understand the fundamentals of Good design compositions and learn why a particular thing is good / not.
3. Use various visual elements to create good compositions in 2D with balance, harmony a good sense of proportions etc.
4. To be able to use radii manipulation, form integration, harmony of forms to communicate intangible attributes.

Course Outcome:

1. Ability to imagine and create transition of 2-D forms through Simplification, Manipulation etc.
2. Ability to create, understand and express new forms / cross-sections using these basic fundamental exercises in Design.
3. Create personally significant works of design applying basic design concepts and techniques.
4. Assess, evaluate, appreciate and respect design work.
5. Develop creative solutions to design problems.

Syllabus details

Unit	Details

1	Various elements of design such as balance, harmony, rhythm, form, composition, colour etc. will be introduced to students through various exercises. They will create meaningful compositions with various 2D elements like lines, curves, circles etc. and will create 3D forms which convey some theme. Through this process the student is learning to "see", by having a visual sensitivity that is the fundamental core strength of a designer. **2D Forms:** ● Understanding Composition through photography with respect to balance, harmony, rhythm etc. ● Creating meaningful 2D compositions with lines, curves circles etc. ● Radii manipulation to understand 2D form characteristics. ● 2D form generation using radii manipulation technique ● 2D form transition. **Typography:** ● The famous 95% ● Typefaces vs. fonts ● Typographic Classifications ● Typographic Anatomy ● Spacings and Punctuations ● Hierarchy **Basic Principles of graphic design:** ● Balance and Proportions: Balance is how the elements of a design are distributed throughout a layout. Proportion is important and represents the scale of elements compared to each other. ● Dominance and Priority: The dominance level is the one which prioritizes the importance of different elements, such as menu, logo, content or footer.

	• Contrast and Rhythm: The rhythm of the page is the principle that makes the human eye move from one element to another. It ensures the flow of the eye and in which order users should see the elements. • Harmony and Unity:

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.	Dansk Design	Thomas Dickson	-
2.	Typography	Gavin Ambrose/ Paul Harris	-

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	To develop the understanding towards various Elements Of Design that plays a very important role.				3				
2	To be able to imagine and create transition of 2-D forms through Simplification, Manipulation etc.				3				
3	Use various visual elements to create good compositions in 2D with balance, harmony a good sense of proportions etc.				3				
4	To be able to use radii manipulation, form integration, harmony of forms to communicate intangible attributes.				3				

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**History of Design**
2	**Level**	**1**
3	**Credits**	**3**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. Recognize key works of design and place them in the appropriate social and cultural climate;
2. Trace the formal sources of works of art and design and identify their impact, both historically and critically;
3. Consider the relationships between the design, fine art and applied arts disciplines as mutually important partners in visual production;
4. Cultivate theoretical curiosity for the changing cultural functions of design, fine art and applied arts in the industrial period;
5. Describe works perceptively and comment on them with critical discernment, attempting to evoke the expressive and/or ideological content of objects of design;

6. Present a combination of factual and subjective arguments in an articulate and critical manner, whether spoken or written.

Course Outcome:

1. Understanding the sequence and reasons of the changes occurred throughout the history to be able to understand the emotion and value that goes behind designing a product.
2. Knowledge of various design and fashion trends in the past and the factors influencing the same.
3. Ability to define and discuss the major stylistic periods in the history of design; recognize the work of the major designers; understand the influence of art, politics, history, philosophy and technology on the evolution of these design movements; and utilize terminology and interpretive approaches to synthesize all of this material.

Syllabus details

Unit	Details

1	In this course, students will gain an understanding of the history of Industrial Design industry. Developments in product design and functionality will be understood in the context of their time to fully appreciate the impact and significance of the events being studied. Students will therefore gain insights into two important spheres; “the cultural” and “the technological”, and the interplay between these two. Like art and architecture, the products that populate our world are reflections of our culture and society, our shared values and ethics, our capabilities and our technical knowledge. Also like art and architecture, industrial design has gone through many movements since its beginnings in the industrial revolution. Throughout these movements, industrial designers have taken the role of integrating new technologies into common use. Students learn about the major design movements throughout the 20th century, focusing on the relationship between technological development and product design. Influential designers are profiled. Students research a particular movement within the 20th century and present their research.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.	**The Design Encyclopedia**	**Mel Byars**	

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Recognize key works of design and place them in the appropriate social and cultural climate;	1		2				3	
2	Trace the formal sources of works of art and design and identify their impact, both historically and critically;	1		2				3	
3	Consider the relationships between the design, fine art and applied arts disciplines as mutually important partners in visual production;	1		2				3	
4	Cultivate theoretical curiosity for the changing cultural functions of design, fine art and applied arts in the industrial period;	1		2				3	

5	Describe works perceptively and comment on them with critical discernment, attempting to evoke the expressive and/or ideological content of objects of design;	1		2				3	
6	Present a combination of factual and subjective arguments in an articulate and critical manner, whether spoken or written.	1		2				3	

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Physical Modelling Processes**
2	**Level**	**1**
3	**Credits**	**4**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. Make suitable scaled models using materials like Polystyrene Foam, Polyurethane Foam, Industrial Clay, etc.
2. Achieve dimensional accuracy and surface finish based on sketches and technical drawings.
3. Have knowledge of the range of modeling types and their applications.
4. Be able to make simple models of the design objects in the workshop.
5. Have a general understanding of fabrication techniques and finishing processes involved in the execution of prescribed design modeling projects.
6. Have a working knowledge of the application and operation of manual and semi-automatic equipment.

7. Understand occupational health and safety policy requirements of the model making workshop environment and be able to demonstrate safe working practices on a selected range of equipment..

Course Outcome:

1. Competency in model making that they can then apply in future studio courses.
2. Understanding of various modeling techniques involved with different types of materials used.
3. Practical know-how of the process from Design to Prototyping.
4. Fluency in expressing the required form/ structure in an almost suitable material with simulation of desired design concept.
5.

Syllabus details

Unit	Details

1	This unit deals with the practical aspects of making models in a workshop, embracing workshop practices, modeling techniques and using manual or semi-automated tools. Students undertake programmed exercises in model making including three dimensional form development, and gain an understanding of the physical and chemical properties of modeling materials. Tools and techniques for carving clay, foam and Plaster of Paris will be discussed and students will receive individual assistance with their models. Students will gain competency in model making that they can then apply in future studio courses.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Make suitable scaled models using materials like Polystyrene Foam, Polyurethane Foam, Industrial Clay, etc.					3			
2	Achieve dimensional accuracy and surface finish based on sketches and technical drawings.					3			
3	Have knowledge of the range of modeling types and their applications.					3			
4	Be able to make simple models of the design objects in the workshop.					3			
5	Have a general understanding of fabrication techniques and finishing processes involved in the execution of prescribed design modeling projects.					3			

6	Have a working knowledge of the application and operation of manual and semi-automatic equipment.					3			
7	Understand occupational health and safety policy requirements of the model making workshop environment and be able to demonstrate safe working practices on a selected range of equipment..					3			

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Aesthetics and Creative Appreciation**
2	**Level**	**1**
3	**Credits**	**1**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. To cover essentials of aesthetical aspects of designing.
2. Generating a critical point of view over design.
3. To develop an ability to appreciate a range of cultural expression, art and design as well as the ability to generate useful and original idea.

Course Outcome:

1. Understanding basic importance of aesthetics in designing a product and implementing it in the design process

2. Creating sensitivity and understanding towards defining the beauty of a design
3. Developing both appreciative and critical perspective towards a design
4. A respect for the arts as a means of personal, cultural, or social expression.
5. An appreciation of design principles and the use of imagination .
6. A willingness to seek out experiences with art and design.
7. The ability to use creative strategies, such as learning to change perspective, in order to generate original and useful ideas

Syllabus details

Unit	Details
1	This course covers the significant question of aesthetics of a product. Students will cover such topics as the fundamental of aesthetics, definitions and glossaries etc, so that students may become conversant with the specialist aspects of styling. Several case studies will be done so that students will see how the subject relates to real examples and will be able to test their own interpretations against those of their peers. This unit investigates the visual and theoretical languages of design in relation to a number of key critical issues. It focuses on issues including the engagement of works of design with society, consumerism, gender, politics, and the environment. The role of the designer in responding to aesthetic and social challenges is also considered. Students will continue to develop a range of approaches to understanding works of design and related issues while also refining the broader critical and analytical skills necessary to their disciplines.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.	Design is How it Works	Jay Greene	-
2.	Creative Confindence	Tom Kelley/ David Kelley	-

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	To cover essentials of aesthetical aspects of designing.	1						2	

2	Generating a critical point of view over design.	1						2	
3	To develop an ability to appreciate a range of cultural expression, art and design as well as the ability to generate useful and original idea.	1						2	

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Photography and Digital Editing**
2	**Level**	**1**

3	**Credits**	**2**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. The main objective of this course is to provide a basic understanding of the visual and technical skills of photography.
2. This course will cover aspects photography involving camera operation, exposure control, editing and presentation of the final image.
3. Principles of lighting and colour theory to a variety of photographic scenarios.

Course Outcome:

1. Develop knowledge of principles of aesthetics and visual communication.
2. Integrate basic photography principles creatively in still and motion based images in storytelling.
3. Demonstrate thorough knowledge and application of camera techniques to capture still based imagery.
4. Experience in vector and raster graphics programs through incremental exercises as they gradually build up presentation skills.
5. Develop a thorough and adaptable knowledge of software used in digital imaging.

Syllabus details

Unit	Details
1	This course introduces digital media as a tool to enhance the designing and presentation skills of the student to attain a professional level of design practice. This course introduces the aesthetic and technical theories and techniques of digital photography. Course includes: ● camera and lens operation, ● exposure, white balance, ● composition, lighting, ● file formats, image editing software Course requires a digital camera. Students will gain experience using vector and raster graphics through incremental exercises as they gradually build up their presentation skills.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.	Fotografando L'acqua	Emanuele Visentin	-
2.	The Photoshop Elements book	Image Publishing	-

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	The main objective of this course is to provide a basic understanding of the visual and technical skills of photography.								
2	This course will cover aspects photography involving camera operation, exposure control, editing and presentation of the final image.								
3	Principles of lighting and colour theory to a variety								

	of photographic scenarios.								

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**COMPOSITION & RHETORIC**
2	**Level**	**Undergraduate**
3	**Credits**	**3**

Course objectives:

The course focuses on the major genres of literature (fiction, poetry, drama, and essays) and improve students' ability to read and analyse a variety of texts.

Course Outcome:

Students will engage in reading, writing and discussion about important ideas drawn from the study of important texts in a variety of areas—including, among others, literary texts, dramatic texts, sacred texts, historical texts, philosophical texts, and scientific texts. They will develop capacities for argument, interpretation, and aesthetic appreciation through engagement with these texts and ideas.

Syllabus details

Unit	Details
1	**Poetry** A) Ode on a Grecian Urn by John Keats B) The Road Not Taken by Robert Frost C) If by Rudyard Kipling **Unit Plan:** 1. To read the original text and analyse poetry **2.** To read other poetries of the different writers of the same and other genres and analyse them.
2	**Understanding Narration** *The Old Man and the Sea* by Earnest Hemmingway **Unit Plan:** To develop imagination skills relating their past and future through writing.

3	**Play** *Hamlet* by William Shakespeare **Unit Plan:** To enact the plays in the classroom.

Suggested reading:

Name of the book	Author
Novels: *Old Man and the Sea*	Earnest Hemmingway
Poems*:* Ode on a Grecian Urn The Road Not Taken If	John Keats Robert Frost Rudyard Kipling
Plays: *Hamlet*	William Shakespeare

Reference Books

Sr. no.	Name of the book	Author

1. 2.	"An Introduction to the Study of Literature" An Anthology of English Poetry	W. H. Hudson Oxford University Press

1	**Course Title**	**Design Drawing**
2	**Level**	**1**
3	**Credits**	**4**
4.	**Course Prerequisite**	**Elementary Sketching**

Outcome related course learning objectives:

1. In this course students will be introduced to the principle techniques of manual freehand drawing and illustration.
2. Students will become proficient in drawing and illustrating a variety of subjects in various compositions in different media, using line, tone and color.
3. As they are introduced to the topics of the course, students will gain insights into the tradition of drawing and illustration.
4. Appreciate product Engineering Drawing as communication system.

5. Understand the importance of product design drawing as a significant component of the Product design process.
6. Execute drawings of three dimensional objects through projections and sectional views that comply with accepted professional industry convention.

Course Outcome:

1. Skillfully apply the techniques, tools, materials, and media employed in manual freehand drawing and illustration.
2. Imagine and accurately translate subjects or scenes into two-dimensional representations on paper using a variety of drawing techniques such as perspectives and proportions.
3. Demonstrate skills in accurately drawing and illustrating a variety of subjects/material like transparent materials, chrome, metal etc manually using pastel, marker, pen/pencil medium.
4. Recognize and discriminate between the various techniques of manual freehand drawing and illustration.
5. Learning product design presentation techniques through series of exercises.

Syllabus details

Unit	Details

1	In this course students will learn to convert design concepts into 2D representations. Drawing manually and freehand, the focus will be on drawing from the imagination. Exercises will cover perspective drawing in detail, product perspective drawing and drawing subjects of different scales. Complex drawings will be executed of subjects at different scales in one, two, and three-point perspective. Students will also be introduced to a wide range of manual rendering techniques in different media. ● Drawing from the imagination ● Perspective drawing, one-, two-, and three-point perspective ● Advanced analytical drawing, foreshortening ● Product design drawing ● Freehand orthographic drawing ● Orthographic and isometric drawing with instruments ● Complex perspective construction drawings ● Basic rendering in grey scale ● Rendering techniques in marker and mixed media

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.	**Sketching: Drawing Techniques for Product Design**	**Koos Eissen**	**-**

2.	**Sketching and Rendering Techniques**	**Fernando Julian**	**-**

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	In this course students will be introduced to the principle techniques of manual freehand drawing and illustration.								3
2	Students will become proficient in drawing and illustrating a variety of subjects in various compositions in different media, using line, tone and color.								3
3	As they are introduced to the topics of the course, students will gain insights into the tradition of drawing and illustration.								3

4	Appreciate product Engineering Drawing as communication system.								3
5	Understand the importance of product design drawing as a significant component of the Product design process.								3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**3D Form Design**
2	**Level**	**1**
3	**Credits**	**4**
4.	**Course Prerequisite**	**Elements of Design**

Outcome related course learning objectives:

1. To develop the understanding towards various Elements Of Design that plays a very important role.
2. To be able to imagine and create transition of 3-D forms through Simplification, Manipulation etc.
3. Use various visual elements to create good compositions in 3D with balance, harmony a good sense of proportions etc.
4. To be able to use radii manipulation, form integration, harmony of forms to communicate intangible attributes.

Course Outcome:

1. Objective is to understand the fundamentals of Good design compositions and learn why a particular thing is good / not.

2. The idea is to teach students to be able to create new forms / cross-sections using these basic fundamental exercises in Design.
3. Sensitivity towards 3D forms and surfaces.
4. Understanding of transformation from 2-Dimesnional

Syllabus details

Unit	Details
1	Form can be described in terms of character, axis, balance, dominance, and position. In this course students will learn about dominant forms and axes by doing a variety of exercises. They will then create dynamic compositions with curvilinear volumes such as cylinders, ovoids, and cones. Students will wrestle with elements that have linear, planar, or volumetric character. Through this process the student is learning to “see”, by having a visual sensitivity that is the fundamental core strength of a designer. ● Fundamentals of design, elements of form, space and structure. ● 3D forms, space and structure. ● Form studies, form transformation and form transition. ● Forms in nature, forms in products. ● Advanced form studies (Nature and Form, Deriving speed forms, product forms by taking inspiration from nature).

Text books

Sr. No	Name of the book	Author	Edition / volume

1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.	**Dansk Design**	**Thomas Dickson**	**-**

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	To develop the understanding towards various Elements Of Design that plays a very important role.								
2	To be able to imagine and create transition of 3-D forms through Simplification, Manipulation etc.								

3	Use various visual elements to create good compositions in 3D with balance, harmony a good sense of proportions etc.								
4	To be able to use radii manipulation, form integration, harmony of forms to communicate intangible attributes.								

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Vehicle Ergonomics and Packaging**
2	**Level**	**1**
3	**Credits**	**3**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. Students will be introduced to the subject of ergonomics (also known as human factors) and its importance in design.
2. The course explains human product and environment relationship and its influence on design.
3. Finding a suitable "Fit" between user and design from health and productivity aspects has been explained.

Course Outcome:

1. Student will have the ability to understand human limitations and its influence on effective design
2. Knowledge of human product and environment relationship for suitable fit solutions.
3. Students will have the ability to study heath and productivity aspect as a consequence of design and as result comes up with improved solutions for end users.
4. Ability to optimize ergonomics in design
5. Ability to develop an ergonomic check lists for products; 4.understand and practice the rules of occupational health and safety in force in the Product design studio

Syllabus details

Unit	Details

1	Students will be introduced to the subject of ergonomics (also known as human factors) and its importance in design. The course will give an overview of the human body, posture, body dimensions, and information processing, environmental factors etc.. Students will participate through lectures and design assignments related to various topics, including body dimensions and so forth. ● Introduction to ergonomics, the scope and history of ergonomics ● Introduction to human body, musculoskeletal aspects, terminology anthropometry (human body dimensions) ● Biomechanical aspects, posture, body movements ● Information processing ● Visual displays of static and dynamic information, text, color code graphic information ● Design for all, inclusive design, design for the disabled, safety standards ● Human body limitations, errors, international standards, domestic standards

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Students will be introduced to the subject of ergonomics (also known as human factors) and its importance in design.						3		
2	The course explains human product and environment relationship and its influence on design.						3		
3	Finding a suitable “Fit” between user and design from health and productivity aspects has been explained.						3		

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Craft Exposure and Creative Art work**
2	**Level**	**1**
3	**Credits**	**3**
4.	**Course Prerequisite**	**Physical Modelling Processes**

Outcome related course learning objectives:

1. To develop an understanding of craftsmanship while designing and making a product. To explore various detailing options for a product.
2. To understand effect of detailing and finishing of a product on perceived value of a product.
3. Understanding of traditional material crafts and its importance in industrialization

Course Outcome:

1. Students are expected to be able to look at products and designs from 'quality of craftsmanship' point of view.
2. To be able to use detailing, materials, finishing etc. to up the perceived value of a product while designing.
3. Understanding of the need of crafts and Industrial art.
4. Approach of exploration in materials traditionally used for making products.
5. Develop a curious mindset and respect for techniques and materials.

Syllabus details

Unit	Details
1	The main objective of this course is to introduce the student to different kinds of craft works and to gain an in-depth knowledge about their methodology and processes. During this course, the students will be exposed to all sorts of crafts and culture artworks. The whole cultural experience will be taken forward by the students as an inspiration to create a piece of artwork at the end of the course.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.	Fantastic Plastics	Susan Mossman	-

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	To develop an understanding of craftsmanship while designing and making a product.					3			
2	To understand effect of detailing and finishing of a product on perceived value of a product.					3			
3	To explore various detailing options for a product.					3			

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	Course Title	Automotive Design Drawing
2	Level	2
3	Credits	4

4.	**Course Prerequisite**	**Design Drawing**

Outcome related course learning objectives:

1. To understand the proportions & perspectives in car exterior design, also the techniques of freehand sketching and rendering using markers, and pastels.
2. Students will explore different applications, and techniques of manual media in Ideation, conceptualization and realization of their Designs.
3. Students will become proficient in illustrating and presenting their ideas and concepts using manual medium.

Course Outcome:

1. Proper understanding of proportions, perspectives, surfaces and details.
2. Skillfully apply the techniques, tools and materials.
3. Demonstrate skills in accurately sketching and rendering vehicles.
4. Ability to make project presentations in a very professional manner using manual medium.

Syllabus details

Unit	Details
1	In this course students will learn how to imagine, visualize and draw cars as three-dimensional objects. Course work will mainly focus on automobile proportions, perspective drawing, lighting and shading effects specific to automobiles. They will be introduced to the techniques of rendering in markers, pastels and mixed media. The aim of this course is to give students the skills to visualize and communicate their design concepts effectively and efficiently. ● Drawing lines, circle and ellipses ● Layout, proportions and scales of vehicles ● Drawing wheels and other geometrical shapes ● Drawing the side view ● Other views of the automobile, perspective drawing and orthographic drawing ● Shading, line weight ● Depicting automotive surfaces through reflections and highlights ● Automobile details such as headlights and glass areas ● Depicting materials and textures such as metal, leather, glass ● Concept development using drawing ● Presentation techniques, colour, composition, contrast etc.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.	NA		

Reference books

Sr. No	Name of the book	Author	Edition / volume

1.	**Sketching: Drawing techniques for Product Designers**	**Koos Eissen**	

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	To understand the proportions & perspectives in car exterior and Interior design, also the techniques of freehand sketching and rendering using markers, and pastels.								3
2	Students will explore different applications, and techniques of manual media in Ideation, conceptualization and realization of their Designs.								3
3	Students will become proficient in illustrating and presenting their ideas and concepts using manual medium.								3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**History of Automobiles Design**
2	**Level**	**2**
3	**Credits**	**2**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. To cover the highly influential events in the history of Automotive contributing to the evolution of the Automotive design process.
2. To generate a sensitivity towards the evolution of design process and the factors affecting the same.

Course Outcome:

1. Understanding the sequence and reasons of the changes occurred throughout the history to be able to understand the emotion and value that goes behind designing a vehicle.
2. History of Automotive brands and the evolution of their design language and the factors affecting the same.
3. Knowledge of contribution of various iconic Design studios and Designers to the Automobile industry.

Syllabus details

Unit	Details

1	In this course, students will gain an understanding of the history of the car and its design. Developments in automobile design and functionality will be understood in the context of their time to fully appreciate the impact and significance of the events being studied. Students will therefore gain insights into two important spheres; "the cultural" and "the technological", and the interplay between these two. ● World automobile industry and the genesis of car design ● Invention of the steam engine, the internal combustion engine, and the first automobile. ● Henry Ford, pioneer of mass production. ● American, European and Japanese companies and their structures ● The Peoples' Car, covering the Fiat 500, VW Beetle, and the Mini ● Legendary sport cars, including the Ferrari 250 GTO, Lamborghini Countach, Jaguar E-type and the Corvette ● The history of concept cars ● The Second World War and the oil embargo ● Famous designers and studios, including Harley Earl, Giorgetto Giugiaro, Marcello Gandini, Italian car design studios, and Cris Bangle ● Cars and movies ● Design for state and royal cars ● Success and failure of car designs ● Indian car design history, pre-liberalization, post-liberalization, and post 2005

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Understanding the sequence and reasons of the changes occurred throughout the history to be able to understand the emotion and value that goes behind designing a vehicle.	1		2				3	
2	History of Automotive brands and the evolution of their design language and the factors affecting the same.	1		2				3	
3	Knowledge of contribution of various iconic Design studios and Designers to the Automobile industry.	1		2				3	

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Introduction to Automotive Technologies**
2	**Level**	**2**
3	**Credits**	**2**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. The main objective of the course is to establish a link between an automobile designer and automobile engineer.
2. It is also an understanding of the principles of engineering that guide development of automobile design and manufacturing.
3. In addition to the technology aspects, automotive car passenger anatomy has been explained. It includes combination of car components and passenger as a package study.

Course Outcome:

1. Students will have the ability to understand different components and systems of an automotive.
2. Students will understand importance of an occupant package and able to draw it considering safety.
3. Students will understand package study as a combination of components and passenger.
4. Students will enhance their research and literature study through final seminar based on chosen automotive technology topic.

Syllabus details

Unit	Details

1	This course covers the fundamentals of the automotive system and components, technologies involved in the vehicle design process, and automotive mathematics. Students will gain an understanding of the principles of engineering that guide the development of the automobile design concept and its manufacturing. The course covers the functioning of the automobile, and gives an overview of the demands placed on the designer. The aim of the course is to establish a link between the designer and an automobile engineer. ● Automotive components and systems, classification of cars, automobile layout and architecture ● The engine and transmission system, types of engines, engine orientation, front and rear wheel drive vehicles, the transmission, gear box, axle, differentials and transaxles ● The steering and suspension system, components, their types, terminologies and functions ● Wheels and tyres, requirements, types and specifications ● Vehicle structure and the body, the frame, sub-frames and body, other components ● Vehicle interiors, the instrument panel, seats and its components, side panels, doors and channels ● Aerodynamics, the basics of fluid flow, air drag, body shapes and its contribution to aerodynamics ● Vehicle mathematics, geometry and trigonometry principle, forces acting on vehicle body, static and dynamics, torques, gear ratios work, energy and power, velocity, acceleration and speed

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	The main objective of the course is to establish a link between an automobile designer and automobile engineer.		3			3			
2	It is also an understanding of the principles of engineering that guide development of automobile design and manufacturing.		3			3			
3	In addition to the technology aspects, automotive car passenger anatomy has been explained. It includes combination of car components and		3			3			

	passenger as a package study.								

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Design Studio 1**
2	**Level**	**2**
3	**Credits**	**4**
4.	**Course Prerequisite**	**Automotive Design Drawing**

Outcome related course learning objectives:

1. The main objective of this course is to develop an understanding of redesigning exterior of an existing car.
2. This course will cover aspects of exterior design such as benchmarking and understanding design language of the brand.
3. This course will also cover identifying the key design features of the existing car and interpreting it in a modern way for the design to be relevant now.

Course Outcome:

1. Students will learn making side views using the existing platform and make appropriate changes for it to look futuristic as well, both in terms of proportions as well as details.
2. Students will also learn how to make different views of the same car and also how to translate side view to front and rear quarter views.
3. Quick volume explorations and detail development using markers and photoshop will also be a learning outcome of this project.
4. Design language study along with understanding of the exterior design development process.

Syllabus details

Unit	Details
1	In this module the students will undertake a study of the exterior of an existing vehicle. They will do visual benchmarking of the vehicle exterior against the competition within the same segment, and then redesign the vehicle exterior on same platform as the existing car. The objective is to build an understanding of the redesign of a new exterior of a car on an existing platform within existing constraints. ● Discussion on the role of designer and scholar ● Introduction to the design brief, analyzing the brief ● Developing the product concept using creativity methods of the divergent phase ● Desk and field research ● Design methods for developing the design concept and details ● Design concept development in two-dimensions ● Design concept development in three-dimensions ● User testing and evaluation ● Communicating and presenting the design concept

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	The main objective of this course is to develop an understanding of redesigning exterior of an existing car.	3	3	2	3				3

2	This course will cover aspects of exterior design such as benchmarking and understanding design language of the brand.	3	3	2	3				3
3	This course will also cover identifying the key design features of the existing car and interpreting it in a modern way for the design to be relevant now.	3	3	2	3				3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Automotive Design Drawing**
2	**Level**	**2**
3	**Credits**	**4**

4.	**Course Prerequisite**	**Design Drawing**

Outcome related course learning objectives:

1. To teach students the tool of free hand sketching for drawing their Automotive interior designs effectively using mediums such as Pencils, Markers, Dry Pastels etc.
2. Students will explore different applications, and techniques of manual media in Ideation, conceptualization and realization of their Designs.

Course Outcome:

1. Developed automotive interior drawing skills (manual) which will help in design projects.
2. Proper understanding of techniques of volume, proportions, perspectives, surfaces and details in design.
3. Ability to develop and represent original ideas and concepts.

Syllabus details

Unit	Details

1	. In this course students will learn how to imagine, visualize and draw cars as three-dimensional objects. Course work will mainly focus on automobile proportions, perspective drawing, lighting and shading effects specific to automobiles. They will be introduced to the techniques of rendering in markers, pastels and mixed media. The aim of this course is to give students the skills to visualize and communicate their design concepts effectively and efficiently. ● Drawing lines, circle and ellipses ● Layout, proportions and scales of vehicles ● Drawing wheels and other geometrical shapes ● Drawing the side view ● Other views of the automobile, perspective drawing and orthographic drawing ● Shading, line weight ● Depicting automotive surfaces through reflections and highlights ● Automobile details such as headlights and glass areas ● Depicting materials and textures such as metal, leather, glass ● Concept development using drawing ● Presentation techniques, colour, composition, contrast etc.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.	**NA**		

Reference books

Sr. No	Name of the book	Author	Edition / volume

1.	**Sketching**	**Koos Eissen**	**1, 2 , 3**

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	To teach students the tool of free hand sketching for drawing their Automotive interior designs effectively using mediums such as Pencils, Markers, Dry Pastels etc.								3
2	Students will explore different applications, and techniques of manual media in Ideation, conceptualization and realization of their Designs.								3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Digital Rendering I**
2	**Level**	**2**
3	**Credits**	**3**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. The main objective of this course is to develop an understanding of the 2d rendering software I.e. Photoshop.
2. The course will cover various aspects such as developing a know-how of various tools , different file size requirements to be followed etc.
3. The course will also cover various rendering techniques, starting with side views for different types of vehicles.

Course Outcome:

1. Students will learn the use of pen tool in order to do precise renders.
2. Apart from developing quick volume explorations, students will also learn doing details such as headlamps and tail lamps.
3. Students will also learn techniques to translate side views to perspective views.
4. The assignments will cover all categories of vehicles for students to develop a thorough understanding of design details related to individual vehicle segments.

Syllabus details

Unit	Details

1	This course introduces digital media as a tool to enhance the designing and presentation skills of the student to a professional level of automotive design practice. Students will gain a foundation and experience in using vector and raster graphics programs through incremental exercises as they gradually build up their skills. Digital media have the potential to enhance the overall performance and efficiency of the designer by reducing effort, time, and increasing the quality of the resulting renderings. ● Raster graphics ● Basics, new document settings ● Scanning, setting up and resolution ● Brushes and painting, colour, layers ● Fixing mistakes, history, undo, revert, printing and page setup ● Tools, dodge and burn, blur and sharpen ● Advanced layers, linking, flattening and merging, blending modes, stacking order, adjustment layers ● Colour correction, levels, curves, colour balance, hue and saturation, shadow highlight ● Corrective filters, blur, noise, sharpen, using liquefy to alter images, using vanishing point ● Filters as textures, artistic, brush strokes, pixelate, sketch etc. ● Selection tools, lasso tools, marquee tools, magic wand ● Quick mask, alpha channels, saving and retrieving selections ● Layer transformations, scale, rotate, warp, perspective, distort, smart objects ● Layer styles, drop shadow, bevel and emboss, glow effects ● Color printing, monitor color vs. screen color, color settings

Text books

Sr. No	Name of the book	Author	Edition / volume

1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	The main objective of this course is to develop an understanding of the 2d rendering software I.e. Photoshop.								3
2	The course will cover various aspects such as developing know-how of various tools, different file size requirements to be followed etc.								3

3	The course will also cover various rendering techniques, starting with side views for different types of vehicles.								3

1 = Objective addressed slightly 2= moderately 3= substantive

PO: Program outcome

1	**Course Title**	**Design Studio 2**
2	**Level**	**2**
3	**Credits**	**4**
4.	**Course Prerequisite**	**Design Studio 1**

Outcome related course learning objectives:

1. The main objective of this course is to develop a basic understanding of redesigning interior of an existing car.
2. This course will cover aspects of interior design such as benchmarking and understanding design language of the brand.

3. This course will also cover identifying the key design features of the existing interiors and interpreting it in a modern way for the design to be relevant now.

Course Outcome:

1. Students will learn making different interior views using the existing platform and make appropriate changes for it to look futuristic as well, both in terms of package and details.
2. The benchmarking exercise will include studying the interiors of vehicles in same segment in order to identify the interior architecture for that particular segment.
3. Students will also learn sketching individual elements in the interiors such as steering, seats, dashborad, centre console, door pad etc.
4. Quick volume explorations and detail development using markers and photoshop will also be a learning outcome of this project.
5. Design language study along with understanding of the interior design development process.

Syllabus details

Unit	Details

1	In this module the students will undertake a study of the interior of an existing vehicle. They will do visual benchmarking of the vehicle interior against the competition within the same segment, and then redesign the vehicle interior on same platform as the existing car. The objective is to build an understanding of the redesign of a new interior of a car on the basis of previously developed exterior design. ● Discussion on the role of designer and scholar ● Introduction to the design brief, analyzing the brief ● Developing the product concept using creativity methods of the divergent phase ● Desk and field research ● Design methods for developing the design concept and details ● Design concept development in two-dimensions ● Design concept development in three-dimensions ● User testing and evaluation Communicating and presenting the design concept

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	The main objective of this course is to develop a basic understanding of redesigning interior of an existing car.	3	3	2	3	2	2	2	3
2	This course will cover aspects of interior design such as benchmarking and understanding design language of the brand.	3	3	2	3	2	2	2	3
3	This course will also cover identifying the key design features of the existing interiors and interpreting it in a modern way for the design to be relevant now.	3	3	2	3	2	2	2	3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Portfolio 1**
2	**Level**	**2**
3	**Credits**	**1**
4.	**Course Prerequisite**	**Introduction to Visual Communication**

Outcome related course learning objectives:

1. Course material includes compiling work into a professional presentation of skills, designs, and the thinking behind the designs; examples of portfolios from previous terms will be shown and their effectiveness will be analyzed.
2. Methods of binding and forms of presentation will be shown and discussed.
3. Additional topics include: networking strategies, approaching a design office, interviewing techniques, and salary negotiation.
4. The final presentation shows all materials in final form, ready for the interview process, as well as presentation at an open house typically attended by students and professionals on campus to interview graduating students.

Course Outcome:

1. Ability to produce an efficient compilation of portfolio presenting their design and art work during the academic program.

Syllabus details

Unit	Details
1	Portfolios provide documented evidence of effectiveness from a variety of sources—not just student ratings—and provide context for that evidence. The process of selecting and organizing material for a portfolio can help one reflect on and improve one's teaching and service. Portfolios are a step toward a more public, professional view of teaching, counseling, and librarianship as a scholarly and collegiate activity. Portfolios offer a look at a range of development over time, helping one to see that teaching and service is an ongoing process of inquiry, experimentation, and reflection.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume

1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	Course material includes compiling work into a professional presentation of skills, designs, and the thinking behind the designs; examples of portfolios from previous terms will be shown and their effectiveness will be analyzed.								
2	Methods of binding and forms of presentation will be shown and discussed.								
3	Additional topics include: networking strategies, approaching a design office, interviewing techniques, and salary negotiation.								

4	The final presentation shows all materials in final form, ready for the interview process, as well as presentation at an open house typically attended by students and professionals on campus to interview graduating students.								

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Design Studio 3**
2	**Level**	**3**
3	**Credits**	**4**
4.	**Course Prerequisite**	**Design Studio 1, 2**

Outcome related course learning objectives:

1. This course aims to introduce students to the principle methods and tools of the Automotive design process through the creative exploration of design.
2. A design project will be done in a real design studio like environment, where students will be introduced to design processes to consider the context of a product, and resolve its utility, its usability, its visual appearance, and its technological aspects.

Course Outcome:

1. Apply a variety of design tools, methods and creativity techniques appropriate to different stages of the design process in order to solve design problems.
2. Analyze the relevant features of design problems and then plan and apply appropriate design processes to resolving them.
3. Compile information about design problems, design processes and design concepts into evocative and convincing presentations in order to communicate with and influence stakeholders.
4. Propose solutions to design problems that meet the needs of, and give due consideration to users, producers, distributors, and other relevant stakeholders.
5. Cooperate with peers in team activities and contribute effectively to group problem solving in all aspects of design projects.
6. Reflect on the design process and propose remedial actions as required, and critically examine performance in line with the concept of lifelong learning.

Syllabus details

Unit	Details

1	In this module the students will undertake a detailed study of an existing vehicle. They will do visual benchmarking of the vehicle exterior against the competition within the same segment, and then redesign the vehicle exterior & instrument panel based on same platform as the existing car. The aim of the course is to familiarize the students with the structural and engineering aspects of vehicle construction that plays a major role in the design of a vehicle. To build an understanding of the redesign of a new exterior and instrument panel design of a car on an existing platform within existing constraints. ● Studying a vehicle, benchmarking and research documentation ● Sketching and digital rendering practice ● Presentations of design methodology, lifestyle issues, mood board, theme board and design board ● Study of the vehicle interior spaces, packaging design and subassembly details of the components ● Benchmarking, user research and product planning ● Vehicle exterior redesign, concept development and refinement into a the final design proposal ● Digital renderings of final design showing the functional and innovative aspects of the redesigned vehicle ● 1:5 measured and dimensioned drawings of final design ● Creation of 1:5 size model with all exterior details ● Finishing and painting of the model ● Instrument panel redesign, generating concepts ● Instrument panel final design submission

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	This course aims to introduce students to the principle methods and tools of the Automotive design process through the creative exploration of design.	3	3	3	3	3	3	3	3
2	A design project will be done in a real design studio like environment, where students will be introduced to design processes to consider the context of a product, and resolve its utility, its usability, its visual appearance, and its technological aspects.	3	3	3	3	3	3	3	3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Design Project - Research**
2	**Level**	**3**
3	**Credits**	**3**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. Be aware of current discourses in a range of disciplines which bear on contemporary design.
2. Assess the bias of an investigative method, considering gender, class and ethnicity.
3. Understand methodology as a critique of method and be able to practice criticism in their chosen field.
4. Be ready to explain the basis of designs or art or craft objects not merely as the outcome of practical constraints but the expression of cultural values.

Course Outcome:

1. To understand & use the methodologies/ tools of design research in the solving of design problems.
2. Ability to raise clear questions, gather, assess, record, and apply relevant information, find patterns and extract insights, generate and use abstract ideas to interpret information, consider diverse points of view, reach well-reasoned conclusions, and test them against relevant criteria and standards
3. Ability to identify consumer needs through understanding of values, cultures, behavioral norms, social patterns, demographics, trends and future scenarios

Syllabus details

Unit	Details
1	This course deals with research data gathering, analyzing, and presenting data in creative and understandable ways. The course combines lectures, desk research such as literature surveys – using the internet, books, and workshops; as well as field work research methods such as interviews, observations, photo-video data collection. ● Introduction to research methods, including qualitative and quantitative research methods ● Research for human factors ● Ethnography, considering the physical, social, cognitive, cultural, and emotional realms ● Design research, including user research and market research. ● Learning about research plans, research questions, and sub-questions, hypothesis, field and desk work, application of research methods for data collection ● Research analysis and presentation techniques, including the creative use of storyboards, mood boards, persona, matrices, and pie charts and so forth.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Be aware of current discourses in a range of disciplines which bear on contemporary design.	3	2	3				3	

2	Assess the bias of an investigative method, considering gender, class and ethnicity.	3	2	3				3	
3	Understand methodology as a critique of method and be able to practice criticism in their chosen field.	3	2	3				3	
4	Be ready to explain the basis of designs or art or craft objects not merely as the outcome of practical constraints but the expression of cultural values.	3	2	3				3	

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Design Studio 4**
2	**Level**	**3**
3	**Credits**	**3**

4.	**Course Prerequisite**	**Design Studio 1,2,3**

Outcome related course learning objectives:

1. This course aims to introduce students to the principle methods and tools of the Automotive design process through the creative exploration of design.
2. A design project will be done in a real design studio like environment, where students will be introduced to design processes to consider the context of a product, and resolve its utility, its usability, its visual appearance, and its technological aspects.

Course Outcome:

1. Apply a variety of design tools, methods and creativity techniques appropriate to different stages of the design process in order to solve design problems.
2. Analyze the relevant features of design problems and then plan and apply appropriate design processes to resolving them.
3. Compile information about design problems, design processes and design concepts into evocative and convincing presentations in order to communicate with and influence stakeholders.
4. Propose solutions to design problems that meet the needs of, and give due consideration to users, producers, distributors, and other relevant stakeholders.
5. Cooperate with peers in team activities and contribute effectively to group problem solving in all aspects of design projects.
6. Reflect on the design process and propose remedial actions as required, and critically examine performance in line with the concept of lifelong learning.

Syllabus details

Unit	Details
1	In this module students will do detailed design research and product planning to arrive at a 'menu' for a new car exterior design. The process will feature detailed design research and product planning, exterior design vehicle packaging ideation for the new car, and advanced professional model-making as key parts of the automotive design studio. The aim of the course is to familiarize the students with the process of designing of a new car, and to build an understanding of the design of a new car exterior, based on a given design brief. ● Benchmarking, research and product planning ● Creating research documentation and presenting that appropriately ● Determining the physical and functional attributes of the vehicle as a result of research findings ● Design of the car architecture and body structure ● Sketching, digital rendering and 3D modeling practice ● Preparing A3 size presentation boards of, package logic board, lifestyle board, mood/theme board, design methodology, and design board ● Package design ideation ● Refinement of selected concept into creating of the final concept ● 3D CAID model (Alias) of final design concept ● Digital renderings of final design concept ● 1:5 dimensioned drawings of final design concept ● Creation of 1:5 size model in industrial clay with all exterior details ● Finishing and painting of the model

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	This course aims to introduce students to the principle methods and tools of the Automotive design process through the creative exploration of design.	3	3	3	3	3	3	3	3
2	A design project will be done in a real design studio like environment, where students will be introduced to design processes to consider the context of a product, and resolve its utility, its usability, its visual appearance, and its technological aspects.	3	3	3	3	3	3	3	3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Automotive User Interface Design**
2	**Level**	**3**
3	**Credits**	**2**
4.	**Course Prerequisite**	**Fundamentals of User Interface**

Outcome related course learning objectives:

1. This course deals with the application of user interface principles to the automotive environment.
2. This course will run in parallel with the advanced design studio for vehicle interiors.
3. Students will investigate the role of interface design in contributing to driver safety and comfort along with fostering a positive driving experience.
4. Introduce the specifics and challenges of In-Vehicle User Interfaces and to provide an overview of the specific requirements of Automotive User Interface, discuss the design of such interfaces with regard to standards and guidelines

Course Outcome:

1. Ability to understand different aspects in automotive user interface.
2. Ability to analyze and benchmark different automotive user interfaces.
3. Ability to apply the learning's in design and development of new automotive interface for the chosen interior considering the latest technological advancements.
4. Ability to evaluate interfaces in the car, discuss the challenges, updated with the latest automated driving technology and present trends in this domain.

Syllabus details

Unit	Details

1	In this course students will study the application of user interface principles to the automotive environment. This course will run in parallel with the advanced design studio for vehicle interiors. Students will investigate the role of interface design in contributing to driver safety and comfort along with fostering a positive driving experience. The course will include a mix of theory, interactive sessions, mock-up design and construction, and testing of interfaces with users. ● Types of information communication and modes of information navigation in the automobile ● Contextual user and market research for automotive interfaces ● Quick mock-ups and testing ● Introduction to automotive user interface, and new techniques of interaction ● User interfaces of automobile components, dashboard, steering, seat accessories, doors ● Classification of user interfaces into informative, entertainment, safety and control, comfort ● Types of communication in automotive user interfaces, texts, color code, symbols, sound ● Information navigation methods, touch, speech, smart techniques (AI) ● Cognitive, vision, interaction aspects of human factors ● Contextual design research, use of research methods, field and desk research, and surveys ● Automotive user interface concept generation, mock-ups and testing

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	This course deals with the application of user interface principles to the automotive environment.						3		
2	This course will run in parallel with the advanced design studio for vehicle interiors.						3		
3	Students will investigate the role of interface design in contributing to driver safety and comfort along with fostering a positive driving experience.						3		

4	Introduce the specifics and challenges of In-Vehicle User Interfaces and to provide an overview of the specific requirements of Automotive User Interface, discuss the design of such interfaces with regard to standards and guidelines						3		

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Alias Automotive Basics (Digital Modelling 1)**
2	**Level**	**3**
3	**Credits**	**3**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. Have an understanding of the principles of designing objects and spaces in three dimensions and their translation into computer-based design methodologies.
2. Be able to use 3D imaging software to create environments and objects.

3. Be able to apply surface qualities, lighting, textures, and imported graphic files to elements in a three dimensional composition.
4. Explore the range of options and controls available through 3D imaging and modeling software applications.
5. Understand and manipulate camera properties and viewer perspectives.
6. Recognize the various applications of 3D design and visualization across multimedia, interior architecture and Product design practices.

Course Outcome:

1. Students will be able to set up, navigate and understand the fundamental interface and work principles of Alias.
2. Ability to create 3D model of simple product in regard to surface continuity, true representation of the product geometry and its appearance through the use of curve and surface construction and editing, with assignment of relevant shading and taking it to the stage of the final rendering for display and presentation purposes.

Syllabus details

Unit	Details

1	In this course students are introduced to CAD 3D surface modelling using the Alias software program. Surface modelling plays an important role in the automotive styling industry for developing and visualizing the product prior to its production. Students will be taught the basics of surface building and how to use the tools to build basic virtual models of different products. ● History of surfacing, its types, and range of software applications ● The basic tools, the Alias user interface and it's customisation and 3D navigation ● Creating and moving objects, organizing the data, construction planes, section manager ● Curve creation and modification, anatomy of a curve, nurbs vs. Bezier mathematics, curve creation, curve modification, blending curves, control point modification ● Surface creation and modification, strictly Bezier using explicit control for class A, surface modification, curves on surfaces, projecting curves, trimming etc. ● Diagnosis tools, measuring g0, g1 and g2 continuity, curvature analysis, highlight analysis, draft angle and deviation maps

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Have an understanding of the principles of designing objects and spaces in three dimensions and their translation into computer-based design methodologies.								
2	Be able to use 3D imaging software to create environments and objects.								
3	Be able to apply surface qualities, lighting, textures, and imported graphic files to elements in a three dimensional composition.								
4	Explore the range of options and controls available through 3D imaging and modeling software applications.								

5	Understand and manipulate camera properties and viewer perspectives.								
6	Recognize the various applications of 3D design and visualization across multimedia, interior architecture and Product design practices.								

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Automotive Materials and Processes**
2	**Level**	**3**
3	**Credits**	**1**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. To provide a starting point for study in materials and various related processes.
2. To inculcate the habit of quickly and efficiently search for the required and useful information in this domain.

3. To build a knowledge resource for students as well as for institute, to be enriched with time.
4. Making 'research in materials and processes', an integral part of design study of students by developing interest in students.

Course Outcome:

1. Knowledge of various materials and related manufacturing processes, Basic knowledge of desired and essential properties leading to a habit of finding out further information in related areas.
2. Ability to find and create knowledge resources in materials and processes field.

Syllabus details

Unit	Details

1	The aim of this module is to prepare students for their professional role in selecting materials and manufacturing processes to produce components for automotive applications. The mechanical behaviour of materials, the relation between the structure and property of materials, matching manufacturing processes to materials, recent developments in materials and manufacturing technologies, will be discussed. ● The car, car component categories, classification of materials, functionality, material choice ● Metals in automotive components, properties, functionality and forming, strengthening mechanisms, ferrous and nonferrous metals, light weight considerations ● Advanced manufacturing process of automotive components ● Metal casting and forging processes, powder metallurgy, sheet-metal forming etc. ● Non-conventional machining technologies, ultrasonic machining, water jet cutting etc. ● Joining technologies, resistance spot welding, plasma technique, laser welding etc. ● Non-metallic materials for automotive components ● Properties of polymers, thermo plastic and thermosetting plastics ● Ceramic materials, properties and applications ● Advantages and limitations of non-metallic materials ● Processing of non-metallic materials ● Processing of polymer materials, injection moulding, extrusion, thermo forming etc. ● Processing of ceramics, slip casting ● Composites in the automotive environment ● Analysis of component failure due to materials and processes ● Case studies on failure analysis of components ● Selection of materials and manufacturing techniques ● Correlation of functionality of the component with material properties ● Selecting materials, processes and joining techniques ● Manufacturing feasibility

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	To provide a starting point for study in materials and various related processes.					3			
2	To inculcate the habit of quickly and efficiently search for the required					3			

	and useful information in this domain.								
3	To build a knowledge resource for students as well as for institute, to be enriched with time.					3			
4	Making 'research in materials and processes', an integral part of design study of students by developing interest in students.					3			

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Portfolio 2**
2	**Level**	**2**
3	**Credits**	**1**
4.	**Course Prerequisite**	**Portfolio 1**

Outcome related course learning objectives:

5.	Course material includes compiling work into a professional presentation of skills, designs, and the thinking behind the designs; examples of portfolios from previous terms will be shown and their effectiveness will be analyzed.
6.	Methods of binding and forms of presentation will be shown and discussed.
7.	Additional topics include: networking strategies, approaching a design office, interviewing techniques, and salary negotiation.
8.	The final presentation shows all materials in final form, ready for the interview process, as well as presentation at an open house typically attended by students and professionals on campus to interview graduating students.

Course Outcome:

1. Ability to produce an efficient compilation of portfolio presenting their design and art work during the academic program.

Syllabus details

Unit	Details
1	Portfolios provide documented evidence of effectiveness from a variety of sources—not just student ratings—and provide context for that evidence. The process of selecting and organizing material for a portfolio can help one reflect on and improve one's teaching and service. Portfolios are a step toward a more public, professional view of teaching, counseling, and librarianship as a scholarly and collegiate activity. Portfolios offer a look at a range of development over time, helping one to see that teaching and service is an ongoing process of inquiry, experimentation, and reflection.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Course material includes compiling work into a professional presentation of skills, designs, and the thinking behind the designs; examples of portfolios from previous terms will be shown and their effectiveness will be analyzed.								
2	Methods of binding and forms of presentation will be shown and discussed.								
3	Additional topics include: networking strategies, approaching a design office, interviewing								

	techniques, and salary negotiation.								
4	The final presentation shows all materials in final form, ready for the interview process, as well as presentation at an open house typically attended by students and professionals on campus to interview graduating students.								

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Design Studio 5**
2	**Level**	**4**
3	**Credits**	**4**
4.	**Course Prerequisite**	**Design Studio 2**

Outcome related course learning objectives:

1. This course aims to introduce students to the principle methods and tools of the Automotive design process through the creative exploration of design.
2. Understanding cultural and social trends and predicting a future scenario
3. Addressing relevant issues and problem in the future scenario
4. Developing futuristic mobility concepts through cycles of research for the future scenario

Course Outcome:

1. Apply a variety of design tools, methods and creativity techniques appropriate to different stages of the design process in order to solve design problems.
2. Analyze the relevant features of design problems and then plan and apply appropriate design processes to resolving them.
3. Compile information about design problems, design processes and design concepts into evocative and convincing presentations in order to communicate with and influence stakeholders.
4. Propose solutions to design problems that meet the needs of, and give due consideration to users, producers, distributors, and other relevant stakeholders.
5. Cooperate with peers in team activities and contribute effectively to group problem solving in all aspects of design projects.
6. Reflect on the design process and propose remedial actions as required, and critically examine performance in line with the concept of lifelong learning.

Syllabus details

Unit	Details
1	**Future Mobility:** This course provides a platform for both theoretical and practical information gathering and reflection about the potential of the transportation designers to work and influence towards future mobility solution. During this course, students are introduced to methods and techniques used in design research for on forecasting on future mobility scenario. The main objective of this project is to prepare the students to identify, map, and suggest innovative solutions for complex upcoming mobility issues or transportation design opportunities that could be approached in depth.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	This course aims to introduce students to the principle methods and tools of the Automotive design process through the creative exploration of design.	3	3	3	3	3	3	3	3
2	Understanding cultural and social trends and predicting a future scenario	3	3	3	3	3	3	3	3
3	Addressing relevant issues and problem in the future scenario	3	3	3	3	3	3	3	3
4	Developing futuristic mobility concepts through cycles of research for the future scenario	3	3	3	3	3	3	3	3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Trend Analysis and Forecasting**
2	**Level**	**4**
3	**Credits**	**2**
4.	**Course Prerequisite**	**Contextual Design Research**

Outcome related course learning objectives:

1. Issues in foresight, opportunities assessment and innovation.
2. Horizon scanning, trend tracking, technology roadmaps, Delphi technique, systems dynamics etc.
3. Statistical tools, extrapolation, probability, variance, regression, correlation techniques etc.
4. Scenarios, versus cases, determining the level of detail, scenarios drive priorities

5. Functions and tasks, common errors and challenges, characterizing the new task design
6. Developing scenarios and Role-playing

Course Outcome:

1. Students will learn to analyze and forecast market needs and hence incorporate this knowledge into their design work.
2. Ability to identify consumer needs through understanding of values, culture, behavioural norms, social patters, trends and future scenarios

Syllabus details

Unit	Details

1	Predicting the future is arguably the most important and hardest task facing strategists. It requires scrutinizing the demographic, technological, environmental, macroeconomic, and other long-term forces constant shaping the global economy. The most important implications typically lurk at the intersections where multiple trends (and dozens or more sub-trends) interact with one another, often in complex and not-so-obvious ways. Moreover, to analyze trends successfully, executives must develop a fine-grained understanding of the potential impact for specific geographies and industries. Every automotive designer creates design concepts according to the market being targeted. It's necessary to study the condition of the market. The students will be doing market trend studies, they will learn to analyze and forecast market needs and hence incorporate this knowledge into their design work. ● Horizon scanning, industry foresight toolbox ● Trend tracking ● Technology roadmaps ● Delphi technique ● Systems dynamics ● Historical and natural precedents ● Demographics ● The power of a scenario ● Scenarios vs. use cases ● Determining the level of detail ● Scenarios sued to drive priorities ● Identifying functions and tasks ● Common errors and challenges in task analysis ● Characterizing the new task design ● Developing scenarios ● Applying the fix task flow method

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Issues in foresight, opportunities assessment and innovation.	3	2	3				3	
2	Horizon scanning, trend tracking, technology roadmaps, Delphi technique, systems dynamics etc.	3	2	3				3	
3	Statistical tools, extrapolation, probability, variance, regression, correlation techniques etc.	3	2	3				3	
4	Scenarios, versus cases, determining the level of detail, scenarios drive priorities	3	2	3				3	

5	Functions and tasks, common errors and challenges, characterizing the new task design	3	2	3				3	
6	Developing scenarios and Role-playing	3	2	3				3	

1 = Objective addressed slightly 2= moderately 3= substantive

PO: Program outcome

1	**Course Title**	**Design Studio 6**
2	**Level**	**4**
3	**Credits**	**4**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. This course aims to introduce students to the principle methods and tools of the Automotive design process through the creative exploration of design.
2. A design project will be done in a real design studio like environment, where students will be introduced to design processes to consider the context of a product, and resolve its utility, its usability, its visual appearance, and its technological aspects.

Course Outcome:

1. Apply a variety of design tools, methods and creativity techniques appropriate to different stages of the design process in order to solve design problems.
2. Analyze the relevant features of design problems and then plan and apply appropriate design processes to resolving them.

3. Compile information about design problems, design processes and design concepts into evocative and convincing presentations in order to communicate with and influence stakeholders.
4. Propose solutions to design problems that meet the needs of, and give due consideration to users, producers, distributors, and other relevant stakeholders.
5. Cooperate with peers in team activities and contribute effectively to group problem solving in all aspects of design projects.
6. Reflect on the design process and propose remedial actions as required, and critically examine performance in line with the concept of lifelong learning.

Syllabus details

Unit	Details

1	The main objective of this course is to develop a holistic and system-level perspective on sustainable urban mobility that takes an integrative approach towards complex problems that leverages Big Data analytics and strategies related to planning, zoning, and public policy. The course will introduce a broad survey of the following key areas of sustainable urban mobility: 1. **Vehicles:** A morphology of vehicle types (buses, cars, trucks, motorcycles, bicycles, Segways) and technologies (electric, hybrids, fuel cells, biofuels, compressed natural gas, etc.) will be presented as well as the latest vehicle innovations (MIT Media Lab's CityCar concept, GM's EN-V, Autonomous Driving). 2. **Urban infrastructure:** Electric charging infrastructure, rapid charging stations, Vehicle-to-Grid (V2G), Smart Grids, novel energy storage, mass transit systems (i.e. Bus Rapid Transit), alternative vehicle lanes, and bike lanes. 3. **Use and Economic Models:** Private car ownership, shared-use systems (i.e. ZipCar, bike sharing programs), fleet operations, public transit, traditional rentals, and Mobility-on-Demand (MoD) Systems.. 4. **Urban Implementation:** Urban design of streetscape, parking, buildings, creation of new urban policy (i.e. congestion pricing, dynamic road pricing), use of intelligent fleet management systems, integration into public transit systems, pilot testing, and deployment. 5. **City Science:** Big Data analytics and interconnectedness of urban systems, including the impact that planning, zoning, and public policy has on mobility mode choices

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	This course aims to introduce students to the principle methods and tools of the Automotive design process through the creative exploration of design.	3	3	3	3			3	3

2	**2.** A design project will be done in a real design studio like environment, where students will be introduced to design processes to consider the context of a product, and resolve its utility, its usability, its visual appearance, and its technological aspects.	3	3	3	3			3	3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**3D CAS Advanced (Digital Modelling 2)**
2	**Level**	**4**
3	**Credits**	**3**
4.	**Course Prerequisite**	**3D CAS Basics**

Outcome related course learning objectives:

1. Skillfully and insightfully create, edit, manipulate, compose and output digital 3-Dimensional elements (i.e. surface models)

2. Explore the range of options and controls available through polygon and software applications and production issues associated with output (i.e. rendering, rapid-prototyping, multimedia, etc) with increasing confidence and proficiency;
3. Produce 3D models with an increased design intention and creative application;
4. Demonstrate increased technical understanding of demands required across the development, application, creation and production of 3D computer-generated models.
5. Display an increasingly personalized expression and sophisticated creative 3D design approach which can be pursued at an advanced stage in subsequent 3D imaging studios;
6. Observe and employ occupational health and safety principles and rules appropriate to studio practice .

Course Outcome:

1. Ability to build a complete Automobile design in Autodesk Alias Automotive software
2. Furthermore, they will be able to analyze and correct surfaces using evaluation and fine-tuning instruments to achieve good continuity and quality of the surfaces in order to finish the model for presentation and rendering purposes.

Syllabus details

Unit	Details

1	This course builds on the 3D CAS course by giving experience in complex 3D designing and A-Class surfacing. Students will learn how to use advanced tools to build virtual models of complex automotive surfaces. Assessment will be based on the work done in the classrooms and in assignment projects. This course will work parallel to the Design Projects course so as to produce a professional 3D CAS model. ● Basic tools, primary, secondary, tertiary and rank 4 surfaces, patch planning and lay outing, additive and subtractive design principles, centre line symmetry fundamentals ● Reverse engineering, capturing scan data, cross sectioning, dynamic cross sectioning and mesh sub-setting, curve fitting, patch fitting on section's and deviation checking with scan, merging the re-model with CAS model of original surfaces ● CAS modeling of a car, set up image planes of sketches, draw outline curves, add character curves, build all the basic panels with construction curves, finish the mono CAS volume of car, trim panels/ lights etc., add various small and top up details ● Class a surfacing, explicit control functionality for Bezier mathematics to create class a surfaces, understanding g3 continuity and its application ● Highlight analysis and its interpretation ● Cross-section curvature needle plot and its interpretation with the highlights of the product

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Skillfully and insightfully create, edit, manipulate, compose and output digital 3-Dimensional elements (i.e. surface models)								
2	Explore the range of options and controls available through polygon and software applications and production issues associated with output (i.e. rendering, rapid-prototyping, multimedia, etc) with increasing confidence and proficiency;								
3	Produce 3D models with an increased design intention and creative application;								

4	Demonstrate increased technical understanding of demands required across the development, application, creation and production of 3D computer-generated models.								
5	Display an increasingly personalized expression and sophisticated creative 3D design approach which can be pursued at an advanced stage in subsequent 3D imaging studios;								
6	Observe and employ occupational health and safety principles and rules appropriate to studio practice .								

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Portfolio Development**
2	**Level**	**4**
3	**Credits**	**3**
4.	**Course Prerequisite**	**Introduction to Visual Communication**

Outcome related course learning objectives:

1. Course material includes compiling work into a professional presentation of skills, designs, and the thinking behind the designs; examples of portfolios from previous terms will be shown and their effectiveness will be analyzed.
2. Methods of binding and forms of presentation will be shown and discussed.

3.	Additional topics include: networking strategies, approaching a design office, interviewing techniques, and salary negotiation.
4.	The final presentation shows all materials in final form, ready for the interview process, as well as presentation at an open house typically attended by students and professionals on campus to interview graduating students.

Course Outcome:

1. Ability to produce an efficient compilation of portfolio presenting their design and art work during the academic program.

Syllabus details

Unit	Details
1	Portfolios provide documented evidence of effectiveness from a variety of sources—not just student ratings—and provide context for that evidence. The process of selecting and organizing material for a portfolio can help one reflect on and improve one's teaching and service. Portfolios are a step toward a more public, professional view of teaching, counseling, and librarianship as a scholarly and collegiate activity. Portfolios offer a look at a range of development over time, helping one to see that teaching and service is an ongoing process of inquiry, experimentation, and reflection.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	Course material includes compiling work into a professional presentation of skills, designs, and the thinking behind the designs; examples of portfolios from previous terms will be shown and their effectiveness will be analyzed.								
2	Methods of binding and forms of presentation will be shown and discussed.								

3	Additional topics include: networking strategies, approaching a design office, interviewing techniques, and salary negotiation.								
4	The final presentation shows all materials in final form, ready for the interview process, as well as presentation at an open house typically attended by students and professionals on campus to interview graduating students.								

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Product Planning and Strategic Branding**

2	**Level**	**4**
3	**Credits**	**2**
4.	**Course Prerequisite**	**Contextual Design Research**

Outcome related course learning objectives:

1. The marketing research process
2. Environment and competitor analysis
3. The new product development process
4. The consumer buying process, marketing environment and competitor analysis, Pricing strategies
5. Introduction to branding, and strategic brand management, Product concepts, product mix concepts, product classification
6. Product planning, the marketing plan, portfolio analysis, market potential and forecasting
7. The product life cycle, product evaluation

Course Outcome:

1. Understanding brands, brand attributes, brand awareness, brand image and associations, brand identity, personality, positioning, brand equity.
2. Design management and branding, product semantics, the product as a symbol Consumer responses to products, cognitive and emotional responses, aesthetic appreciation

Syllabus details

Unit	Details
1	The course will introduce students to product planning and strategy principles used in the automotive industry. Lessons will be given in identifying markets, studying market trends by analyzing existing brands, their philosophies, selling techniques and other marketing phenomena. Students will be given classroom assignments based on the various topics covered in the course; beginning from the very fundamental questions; "What is a brand?" to "How to build a brand?" the course will cover a wide range of issues. ● The marketing research process ● Environment and competitor analysis ● The new product development process ● The consumer buying process ● Marketing environment and competitor analysis and Pricing strategies ● Introduction to branding, and strategic brand management ● Product concepts, product mix concepts, product classification ● Product planning, the marketing plan, portfolio analysis, market potential and forecasting

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume
1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	2	3	4	5	6	7	8
1	The marketing research process	3	2	3				2	
2	Environment and competitor analysis	3	2	3				2	
3	The new product development process	3	2	3				2	
4	The consumer buying process, marketing environment and competitor analysis, Pricing strategies	3	2	3				2	
5	Introduction to branding, and strategic brand management, Product concepts, product mix concepts, product classification	3	2	3				2	

6	Product planning, the marketing plan, portfolio analysis, market potential and forecasting	3	2	3				2	
7	The product life cycle, product evaluation	3	2	3				2	

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome

1	**Course Title**	**Final Thesis Project**
2	**Level**	**4**
3	**Credits**	**12**
4.	**Course Prerequisite**	**NA**

Outcome related course learning objectives:

1. This course aims to introduce students to the principle methods and tools of the Automotive design process through the creative exploration of design.

2. A design project will be done in a real design studio like environment, where students will be introduced to design processes to consider the context of a product, and resolve its utility, its usability, its visual appearance, and its technological aspects.

Course Outcome:

1. Apply a variety of design tools, methods and creativity techniques appropriate to different stages of the design process in order to solve design problems.
2. Analyze the relevant features of design problems and then plan and apply appropriate design processes to resolving them.
3. Compile information about design problems, design processes and design concepts into evocative and convincing presentations in order to communicate with and influence stakeholders.
4. Propose solutions to design problems that meet the needs of, and give due consideration to users, producers, distributors, and other relevant stakeholders.
5. Cooperate with peers in team activities and contribute effectively to group problem solving in all aspects of design projects.
6. Reflect on the design process and propose remedial actions as required, and critically examine performance in line with the concept of lifelong learning.

Syllabus details

Unit	Details

1	The thesis project brief is defined by the students at the outset of this course. In the first stage of this project students will work on their own design concept individually, developing their ideas in consultation with course instructors. At the end of the process, students will produce a 1:5 scale model as a part of their professional presentation of their design concepts. A jury of instructors and invited experts will assess the results of the project and one concept of all those presented will be selected for further development in the following stage. That concept may be the work of an individual student or a combination or amalgam of selected student concepts. In the second stage of the project students will produce a detailed digital model of the selected concept. They will work in two teams, one focusing on the "exterior" and one on the "interior" of the design concept. The outcome of this stage will be a highly refined computer-aided styling (CAS) model of the car.

Text books

Sr. No	Name of the book	Author	Edition / volume
1.			

Reference books

Sr. No	Name of the book	Author	Edition / volume

1.			

Course evaluation matrix

Sr. No	Outcome related Course learning Objective	Program Outcomes							
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
1	**1.** This course aims to introduce students to the principle methods and tools of the Automotive design process through the creative exploration of design.	3	3	3	3	3	3	3	3
2	**2.** A design project will be done in a real design studio like environment, where students will be introduced to design processes to consider the context of a product, and resolve its utility, its usability, its visual appearance, and its technological aspects.	3	3	3	3	3	3	3	3

1 = Objective addressed slightly 2= moderately 3= substantive

PO : Program outcome