(ISO 9001:2015 Certified)

B.DES_INDUSTRIAL & PRODUCT DESIGN

(w.e.f. 2023)

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UNIVERSITY OF TOMORROW

School of Design

Industrial and Product Design

Course book, 2023

Bachelor of Design

Industrial and Product Design

Product Design is concerned primarily with the relationship between products, systems, users and the society. Product designers hold a unique position in the industry. They combine artistic and creative talents with an understanding and knowledge of arts, technology and business to create different products to satisfy the users and the producers. Design dictates cost. Design impact quality of life.

Intent

This program provides opportunities for acquiring knowledge and skills relevant to product design through courses on relevant aspects of design, technology, ergonomics and aesthetics and through projects conducted within a professional environment. The objective is to create professional Product Designers qualified for senior position in industries and institutions. This course will impart education to work in an interdisciplinary environment. Product development cycles are shrinking. Intensive global market competition will continue to demand that good quality products be designed, developed and produced to meet the varied requirements of the users at the shortest possible time. The design process is an essential part of product development. It focuses technical ability on the needs of customers in terms of product performance, usability, aesthetics and value for money. It results in products that have the necessary competitive features to win and hold markets

internationally. This course is designed to educate delegates about the process of designing product/system.

PS / Program Outcomes

PO 1:
Develop a Creative Mind-set

Develop the ability to think out of the box and come up with alternative solutions for every problem. Prepare the mind for the unexpected and develop the ability to explore the unknown

PO 2:
Empathy

Develop the empathy towards end users, which will help arrive at solutions that have a long term benefit for them.

PO 3:
Creative Articulation

Develop the ability to articulate and communicate ideas and concepts verbally, through visual representation and through writing

PO 4:
Discovery to Realization

Develop a strong process oriented mind-set and the ability to identify Insights ranging from small incremental changes to undiscovered value additions for both the end consumer and all stakeholders

PO 5: Design for Future

Develop the ability to harness the technologies of the future and create design solutions to that enhance the lives of people.

PO 6: Multidisciplinary Approach

Inculcate a multidisciplinary mindset that brings a holistic approach towards the overall design process and helps deliver a cohesive outcome.

PO 7: Entrepreneurial Spirit

Develop the ability to think innovatively, take risks, develop and successfully commercialize solutions in evolving market conditions

PO 8: Teamwork

Demonstrate knowledge and understanding of the design principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 9: Professional Ethics

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

PO 10: Sustainable Solutions

Understand the impact of design in the societal and environmental contexts, and demonstrate the knowledge of, and ability to come up with sustainable solutions.

PO 11: Local & Global Context

To demonstrate the knowledge and sensitivity towards local needs and come up with solutions that contribute towards nation building while achieving international quality and benchmarks.

PO 12: Lifelong learning

Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO / Program Specific Outcomes

PSO1 -
Product, User and Market Research

Student will learn user need and aspirations, technological aspects and market positioning of a product / system through detailed design.

PSO2 -
Form Generation, Styling, and Aesthetic Appeal:

Students will gain knowledge and skills related to various types of form (bio-inspired, emotional form, speed form etc.) generation and application of the unique form for multiple purposes such as design of consumer goods, packaging design, product/system modelling etc.

PSO3 -
Tangible Prototyping of a Product / Package / System

Student will learn the both low fidelity and high fidelity prototype making for products/ systems. They will also learn evaluation strategies of these products /systems.

2023-27

Foundation program course grid over view

Foundation Year 1, Semester 1

Sl. No.	Course Code	Course Name	C	L	T	P	Hours
1	SDCS 1014	Sketching Drawing 1	5	4	0	2	
2	SDCS 1026	Elements of Design	3	1	1	2	
3	SDCS 1027	Colour	4	1	2	2	
4	SDCS 1028	Geometry	5	2	2	2	
5	SDCS 1018	SLA	2	1	1	0	
6	SDCS 1006	Material Exploration I	2	1	0	2	
7	SLLS0101	Learning how to learn	2	2	0	0	
8	SLLS0102	Living Conversations	2	2	0	0	
			25	**9**	**11**	**10**	**30**

Foundation Year 1, Semester 2

Sl. No.	Course Code	Course Name	C	L	T	P	
1	SDCS 1019	Sketching Drawing 2	5	4	0	2	
2	SDCS 1020	Principles of Design	5	1	3	2	
3	SDCS 1021	Design Process	6	3	2	2	
4	SDCS 1010	Material Exploration II	2	1	0	2	
5	SDCS 1023	Computer Applications	2	1	0	2	
6	SLLS 0103	Leadership and Teamwork	2	2	0	0	
7	SLSG 0101	Critical Thinking and Writing	3	3	0	0	
			25	**9**	**11**	**10**	**30**

Year 2 , Semester 3

Semester 3, Course grid with CLTP allocation

Sl No	Subject Code	Subject	Credits	Color code	L	T	P
1	SDID 2012	Product Sketching and Rendering 1	3	C	1	0	4
2	SDID 2014	Model Making Techniques	2	C	1	0	2
3	SDID 2015	Applied Ergonomics	3	C	1	0	4
4	SDPJ 2126	Project 1: Simple Product Design	5	C	1	0	8
5	SLLS 0201	Design Thinking	2	LS	2	0	0
6	SLSG 0201	Ethical Leadership in the 21st Century (Human Values and Ethics)	3	Sig	3	0	0
7		Exploratory Elective 1	3	Expl	3	0	0
		Total	**21**		**12**	**0**	**18**
							30

Year 2 , Semester 4

Semester 4, Course grid with CLTP allocation

Sl No	Subject Code	Subject	Credits	Color code	L	T	P
1	SDID 2023	Product Sketching and Rendering 2	3	C	1	1	2
2	SDID 2024	Form Studies	3	C	2	1	0
3	SDID 2025	Material and Processes	3	C	2	0	2
4	SDID 2026	Visual Communication	3	C	3	0	0
5		Professional Elective 1	2	PE	2	0	0
6	SDPJ 2133	Project 2: Lifestyle Product design	5	C	3	1	2
7	SLLS 0202	Working With Data	2	LS	2	0	0
8	SLSG 0202	Environment and Sustainability - Himalaya Fellowship	3	Sig	3	0	0
9		Exploratory Elective 2	3	Expl	3	0	0
		Total	**27**		**21**	**3**	**6**
							30

Year 3, Semester 5

Semester 5, Course grid with CLTP allocation

Sl No	Subject Code	Subject	Credits	Color code	L	T	P
1	SDID 3014	Product Styling	3	C	2	1	0
2	SDID 3026	Design Research Methodology	2	C	2	0	0
3		Professional Elective 2	3	PE	2	0	2
4		Professional Elective 3	3	PE	2	0	2
5	SDPJ 3131	Project 3: Display and Control	5	C	1	0	8
6	SLLS 0301	Persuasive Presence	2	LS	2	0	0
7	SLSG 0301	Start your Start-up	3	Sig	3	0	0
8		Exploratory Elective 3	3	Expl	3	0	0
		Total	**24**		**17**	**1**	**12**
							30

Year 3, Semester 6

Semester 6, Course grid with CLTP allocation

Sl No	Subject Code	Subject	Credits	Color code	L	T	P
1	SDID 3001	Joining and Fastening Devices	2	C	1	0	2
2		Professional Elective 4	4	PE	1	0	6
3		Professional Elective 5	3	PE	1	0	4
4	INDT 3101	Industrial visit	1	C	1	0	0
5	SDPJ 3132	Project 4: Technically Complex Product	5	C	2	0	6
6	SLSG 0302	Solving Complex Problems	3	Sig	3	0	0
	SLSG 0303	Technologies of the Future					
	SLSG 0304	Future Casting					
	SLSG 0305	Managing Relationships and Being Happy					

7		Exploratory Elective 4	3	Expl	3	0	0
		Total	**21**		**12**	**0**	**18**
							30

Year 4, Semester 7

Semester 7, Course grid with CLTP allocation

Sl No	Subject Code	Subject	Credits	Color code	L	T	P
1	SDCS 4001	Design Management	2	C	2	0	0
2	SDID 4012	Semantics and Semiotics	3	C	2	0	2
3	SDID 4009	Seminar: Design for Future	1	C	1	0	0
4		Professional Elective 6	3	PE	2	0	2
5	SIIB 4101	Summer Internship	2	C	0	0	4
6	SDPJ 4130	System Design	5	C	1	0	8
7	SLSG 0401	India and Its Place in the Contemporary World	3	Sig	3	0	0
	SLSG 0402	Theory of Everything					
	SLSG 0403	Digital Transformation					
	SLSG 0404	Finding your purpose in Life					
8		Exploratory Elective 5	3	Expl	3	0	0
		Total	**22**		**14**	**0**	**16**
							30

Year 4, Semester 8

Semester 8, Course grid with CLTP allocation

Sl No	Subject Code	Subject	Credits	Color code	L	T	P
1		Graduation Project: Industrial Design	15	Inds	0	0	30
		Total	**15**				**30**

List of Professional Electives

Sl No	Code	Professional Elective I (Sem 4)	Credit	L	T	P
1	SDID 2021P	Advance Ergonomics	2	2	0	0
2	SDID 2022P	Product Presentation	2	2	0	0
3	SDID 2029P	3D Computer Application	2	2	0	0
4	SDID 2027P	Professional Documentation	2	2	0	0

Sl No	Code	Professional Elective 2 (Sem 5)	Credit	L	T	P
5	SDID 3027P	Biomimicry	3	2	0	2
6	SDID 3015P	The Wearables	3	2	0	2
7	SDID 3016P	Craft Design	3	2	0	2

Sl No	Code	Professional Elective 3 (Sem 5)	Credit	L	T	P
8	SDID 3017P	Packaging Design	3	2	0	2
9	SDID 3024P	Photography and Videography	3	2	0	2

Sl No	Code	Professional Elective 4 (Sem 6)	Credit	L	T	P
10	SDID 3020P	Digital Interface and Experience Design	4	1	0	6
11	SDID 3021P	Digital Marketing	4	1	0	6
12	SDID 3022P	Tangible Interface Design	4	1	0	6

Sl No	Code	Professional Elective 5 (Sem 6)	Credit	L	T	P
13	SDID 3023P	Furniture Design	3	1	0	4
14	SDID 4010P	Advance Design Tools	3	1	0	4

Sl No	Code	Professional Elective 6 (Sem 7)	Credit	L	T	P
15	SDID 3018P	Surface Design: Color and Texture	3	2	0	2
16	SDID 4011P	Mechanism and Robotics	3	2	0	2

Foundation

Semester 1

Year 1

2023-27

SKETCHING AND DRAWING-I

Foundation @ SOD

L	T	P	C
4	0	2	5

COURSE BRIEF

Drawing is a language /tool which help design student represent their concept and ideas. Since primitive age drawing was a best way of communicating thought or Idea. Ability to use lines and draw is a basic requirement of design practice. This module introduces students to the essentials of freehand drawing and enables them to draw what the eye observes, and the mind perceives. They are guided on how to use drawing as a powerful communication tool and about coordination of hand, eye and mind.

LEARNING OBJECTIVES

The module introduces the students to

- The fundamentals of Visual Perception and Spatial Positioning of Figures/ Objects in two dimensions and three dimensions
- Observe and represent observation with different lines.
- Develop line quality with rigorous sketching.

COURSE CONTENTS

- **Drawing basics:**

  Types of pencils and their characteristics, how to hold a pencil, importance of wrist and elbow movements, how to draw lines and circles, importance of drawing in single strokes, disadvantages of broken wrist movement, gain control over eye and hand coordination.

➢ Nature Drawing :

Importance of pressure while drawing a line. Impact of variation in pressure on the quality of drawing. Understand basic units, (e.g. a leaf) their proportions and relationship with the whole. Draw simple units, without details.

➢ Human Drawing:

Understand the proportions of body. Different parts of human body, their proportional relationship within and without, learn to draw parts without details.

➢ Object Drawing:

Basic dimensions, how three dimensions build up volumes, representation of three axes in 2 D, principles of isometric and perspective drawing, simple isometric and perspective drawing in one, and two point perspectives.

COURSE OUTCOMES

Knowledge & Understanding:

After completing this course, you will be able to:

- Develop observation skills and understanding of tools to draw (CO1)
- Understand proportions of human body and objects and their relationship to the environment (CO2)

Skills and Attributes:

- Apply observational skills to draw nature, human and object drawings (CO3)
- Sketch forms and figures with an understanding of proportions, light and shade, angles and perspective (CO4)

Co-relation Course Outcomes (COs) and Program Outcomes (POs)

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Teamwork	Professional Ethics	Sustainable Solution	Local and Global Context	Lifelong Learning
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	2	1	3	2	3	3	0	0	0	0	3	3
CO 2	2	2	3	2	3	2	0	0	0	1	1	3

CO 3	3	2	3	3	3	2	0	0	0	2	2	3
CO4	3	1	3	3	3	2	0	0	2	2	2	3

PREREQUSITES AND MATERIAL

1. Basic drawing skill
2. Pencil (2B , 4 B, 6B) Paper (cartridge paper, color , and other types of paper)
3. Require few object and human models for Live sketching

REFERENCE BOOKS

1. Sketching: Drawing Techniques for Product Designers by Koos Eissen(Author), Roselien Steur(Author), BIS Publishers
2. Drawing for Product Designers (Portfolio Skills: Product Design) by Kevin Henry, Laurence King Publishing
3. Perspective and Sketching for Designers by Jessica Newman, Jessica Newman and Jack Beduhn, Prentice Hall
4. Freehand Drawing For Architects and Interior Designers by Magali Delgado Yanes, Magali Delgado Yanes (Author), Ernest Redondo Dominguez and Maria Fleming Alvarez, W. W. Norton & Company
5. Design Drawing by Francis D. K. Ching and Steven P. Juroszek, Wiley
6. How to Draw: drawing and sketching objects and environments from your imagination by Scott Robertson and Thomas Bertling, Design Studio Press
7. Sketching: The Basics by Roselien Steur an Koos Eissen, BIS Publishers
8. Anatomy and Drawing by Victor Perard, Dover Publications
9. Illustration With Markers/Time-Saving Techniques for Design Professionals by John A. Gleason, Whitney Library of Design
10. Rendering with Pen and Ink by Robert W. Gill, W Norton & Co Inc

URL

- https://www.creativebloq.com/features/how-to-draw-animals-people-landscapes
- https://design.tutsplus.com/tutorials/how-to-draw-a-rose--cms-26864
- https://www.thegreatcourses.com/courses/how-to-draw.html
- http://www.floobynooby.com/pdfs/Perspective_Drawing_Handbook-JosephDAmelio.pdf
- https://www.pdfdrive.com/human-figure-drawing-books.html

ELEMENTS OF DESIGN

Foundation @ SOD

L	T	P	C
1	1	2	3

COURSE BRIEF

The elements of design are the basic components used as part of any composition. They are the objects to be arranged, the constituent parts used to create the composition itself. In most situations the elements of design build upon one another, the former element helping to create the latter. The module focuses on ways of thinking and seeing with focus on the elements like a dot, a line, color, shape, form, texture, pattern etc.

LEARNING OBJECTIVE

The module introduces the students to

- Understand fundamentals related to elements of design and develop sensitivity towards Visual Perception.
- The various characteristics of each element and their applicability.

- Explore according to aptitude and thought process. Such explorations imbibe sensitivity towards the various characters of each element and the variations that can be created by appropriate utilization of these characteristics.

COURSE CONTENT

- **Dot**

What is a dot? Arrangement of dots, image creation with dots, density of dots, impact of varying densities of dots, relationship of density with clarity of pictures/images,

- **Line**

Line as extension of dots, straight and curved lines, various attributes of line, (width, thickness, weight, length, direction) combination of various types of lines, effect of line orientations

- **Texture and pattern**

What is texture? Texture and pattern in nature and man-made environment, analysis of texture and patterns, exploration with different media

- **Shape**

Definition/ identification of shape, (through lines, value, color, texture etc.) Geometric and organic shapes. Linear and complex shapes. Interaction of shapes

- **Size/scale**

Basic understanding of scale and size. How sizes play a role in gaining/losing dominance over other elements in a given format.

- **Form and space**

Definition of negative and positive spaces. Relationship between positive and negative spaces. Transition from space to form and vice versa.

COURSE OUTCOME

Knowledge & Understanding:

After completing this course, you will be able to:

- Develop creative conceptual ability and sensitivity to visual perception (CO1)
- Understand fundamentals of visual interactions that exist between two or more elements (CO2)

Skills and Attributes:

- Apply understanding of elements to create effective compositions (CO3)
- Demonstrate an ability to present creative ideas using design language (CO4)

Co-relation Course Outcomes (COs) and Program Outcomes (POs)

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Teamwork	Professional Ethics	Sustainable Solution	Local and Global Context	Lifelong Learning
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	3	1	3	2	2	2	0	0	2	2	2	3
CO 2	2	1	3	2	2	2	0	0	0	1	2	3
CO 3	3	1	3	2	2	2	0	0	3	2	2	3
CO4	3	2	3	3	2	2	0	0	2	2	2	3

PREREQUSITES AND MATERIAL

1. Poster color, Black Ink, Scale, Markers and Geometry Box.
2. Brush(0,2, 4 ,8,) Paper (cartridge paper, color , and other types of paper)
3. Acrylic or water and oil-based color require to explore student in bigger surface.

REFERENCE BOOKS

1. Design Basics by David A. Lauer Learning.
2. Design Elements: Understanding the rules and knowing when to break them by Timothy Samara, Rockport Publishers.
3. Design Elements, Form & Space: A Graphic Style Manual for Understanding Structure and Design by Dennis Puhalla, Rockport Publishers.

COLOUR

Foundation @ SOD

L	T	P	C
1	2	2	4

COURSE BRIEF

Colour, or color, is the characteristic of human visual perception described through with names such as red, orange, yellow, green, blue, or purple. The module explores an understanding of three basic elements that are required for an appreciation of color: a light source, an object, and a viewer. It also helps to explore the psychological and cultural factors involved in perception. The importance of color design stems from the significance of color to the human mind and this module shall help in creating ideas, expresses messages, spark interest, and generate certain emotions through compositions.

LEARNING OBJECTIVES

One of the most important elements of design, color, is being treated as a separate subject, to learn and explore more in the same. This subject exposes the student to the basic characteristics of color, and the additive and subtractive color theories and its application.

COURSE CONTENTS

- Color terminologies – hue, value, tint, shade, intensity, Chroma, etc.
- Primary colors
- Secondary colors
- Color wheel
- Intermediate colors
- Complimentary colors
- Split complimentary colors
- Grey scale
- Color schemes: monochromatic, warm, cool, complimentary, split complimentary, triadic, analogous,
- Color interaction

COURSE OUTCOMES

Knowledge & Understanding:

After completing this course, you will be able to:

- Demonstrate an understanding of color theories and color interaction in your work (CO1)
- Explain and translate the understanding of color terminology in compositions (CO2)

Skills and Attributes:

- Generate practical application and understanding of colors (CO3)
- Demonstrate an ability to present creative contextual compositions (CO4)

Co-relation Course Outcomes (COs) and Program Outcomes (POs)

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Teamwork	Professional Ethics	Sustainable Solution	Local and Global Context	Lifelong Learning
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	3	2	3	0	2	1	0	0	2	0	3	3
CO 2	2	1	3	0	2	1	0	0	3	1	2	3
CO 3	3	1	3	1	1	1	0	0	3	2	2	3
CO4	3	1	3	0	3	1	0	0	3	2	2	3

PREREQUSITES AND MATERIAL

1. Poster color, mostly camel
2. Brush(0,2, 4 ,8,) Paper (cartridge paper, color , and other types of paper)
3. Pastel, and acrylic or water and oil-based color require to explore student in bigger surface.

REFERENCE BOOKS

1. Color influencing form : a color coursebook by Roy Osborne. Publication - Boca Raton, FL: Universal Publishers, 2007
2. Color, form and space by Birren, Faber, Publication- New York. : Reinhold., 1960
3. Colour Interaction with a Three Dimensional Form by Vyas, H. K. 1968
4. Elements of Design: (Advanced) Form & ColourVyas, H. K.
   Design I: The Elements Videotape; Color, Line, Shape & Form, Pattern by Texture Atexinc.
5. The Forms of Color by Gerstner, Karl, Publication -Cambridge : The MIT Press, 1990
6. Colour for Survival by Ward, Peter, Publication - London : Orbis pub, 1980
7. Playing with color: 50 graphic experiments for exploring color design principles by Richard Mehl, Publication - Beverly: Rockport Publishers, 2013
8. Color management : a comprehensive guide for graphic designers (2005 ed.)by John T Drew and Sarah A Meyer, Publication - Switzerland : Roto Vision, 2005
9. Colour: Art & Science edited by Trevor Lamb, Janine Bourriau. Publication - Cambridge University Press.
10. Goethe's Theory of Colours By Johann Wolfgang von Goethe .
11. Colour: A Workshop for Artists and Designers by David Hornung.

REFERENCE URL's

https://www.pantone.com/what-is-color

https://www.quora.com/What-are-designer-colours

https://www.crayola.com/for-educators/resources-landing/articles/color-what-is-color.aspx

GEOMETRY

Foundation @ SODS

2023-27

L	T	P	C
2	2	2	5

COURSE BRIEF

The course introduces the students to the basic fundamentals of Construction, Visual Perception and Spatial Positioning of Figures/ Objects in 2 Dimensions and 3 Dimensions. The students are empowered with the knowledge and skills to interpret and represent development of 2D and 3D geometry in the form of drafted sheets and study models. The module covers the practical nuances of drafted drawing as an effective communication tool in a cross functional production scheme.

LEARNING OBJECTIVE

Learn axes, planes of projection and types of graphical representations.

Learn standard guidelines of drafting in 2d and 3D representations.

Learn basic geometric shapes and properties, construction of 3d form.

COURSE CONTENTS

UNIT 1 (Fundamentals of Drafting)

Guidelines and Nomenclatures, Lettering, Scales (Engineer's scale, Graphical Scale, Representative Fraction), Two Dimensional Geometrical Constructions (Line and Angle Bisection, Division of lines and circle, Centre point of arc, Calculation of Arc length, Reverse Curves, Evolution and construction of Polygons), Conics and Curvilinear Objects, Representation of 3 Dimensional objects, Principles of Projections, Projections of Points.

UNIT 2 (Principles of Geometry)

Geometry in natural and Man-made environments, Relationship of Pentagon and natural objects, Vitruvian man, Fibonacci series and Golden Ratio, Fractals.

UNIT 3 (Projections of Lines and Solids)

Guidelines and Nomenclatures, Lettering, Scales (Engineer's scale, Graphical Scale, Representative Fraction), Two Dimensional Geometrical Constructions (Line and Angle Bisection, Division of lines and circle, Centre point of arc, Calculation of Arc length, Reverse Curves, Evolution and construction of Polygons), Conics and Curvilinear Objects, Representation of 3 Dimensional objects, Principles of Projections, Orthographic Projections- Isometric and Axonometric projection of of regular solids and combination of solids.

UNIT 4 (3D geometry and Development of solids)

Solids (Generation of Volumes, Basic Solids, Additive and Subtractive nature of solids, Development of Surfaces of regular and sectional solids), **Platonic and Archimedean solids** (Identities and differences, Importance and application, Duals of Platonic solids, Truncation of solids)

COURSE OUTCOMES

Knowledge & Understanding:

After completing this course, you will be able to:

- CO1: Demonstrate an understanding of geometric principles in nature
- CO2: Develop an understanding of terminology used to explain projections and fundamentals of drafting

Skills and Attributes:

- CO3: Create platonic solids reflecting an understanding construction of the same
  CO4: Demonstrate and explain the construction of 2D and 3D objects

Co-relation Course Outcomes (COs) and Program Outcomes (POs)

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Teamwork	Professional Ethics	Sustainable Solution	Local and Global Context	Lifelong Learning
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	2	2	2	2	2	1	0	0	0	3	2	3
CO 2	2	2	2	2	2	1	0	0	3	1	2	3
CO 3	2	1	2	2	1	1	0	0	3	1	2	3
CO4	3	1	3	1	2	1	0	0	2	1	1	3

PREREQUSITES AND MATERIAL

1. Drawing Board, T square, Set Square, Geometry Box, Brush and Glue

2. Paper (cartridge paper, color , and other types of paper)
3. Acrylic or water and oil-based color require to explore student in bigger surface.

REFERENCE BOOKS

- Engineering Drawing, P.S. Gill, S. K. Kataria & Sons
- Elementary Engineering Drawing (Plane and Solid Geometry), by N.D. Bhatt, Charotar Publishing House
- Geometry of Design: Studies in Proportion and Composition, Kimberly Elam, 2001
- Alt.fractals: A Visual Guide to Fractal Geometry and Design by Eric Baird, 2011
- The Aesthetics of Geometry in Design, Suzanne Greischel, 1983
- Shell foundations: geometry, analysis, design and construction, N. P. Kurian 2006
- Geometry of construction, T.B. Nichols and Norman Keep. Nichols, Trafalgar Bertram. Publication - London : Cleaver-Hume Press, 1947
- Ruler and Compass, Andrew Sutton, 2009
- Geometric constructions with 112 figures, George Edward Martin,1998

SCIENCE & LIBERAL ARTS

Foundation @ SODS

L	T	P	C
1	1	0	2

COURSE BRIEF

The subject aims to introduce design students to Indian Visual culture, history and Society through a Liberal Arts perspective. It aims to sensitize students to the visual aesthetics, cultural practices, viewed against the backdrop of various regional, social, and historical contexts.

LEARNING OBJECTIVE

- To sensitize design students to social, cultural, and historical contexts surrounding design.
- To enable students to discover values, belief systems, and philosophies that underly various cultural, and aesthetic expressions.
- To introduce and expose students to Indian and global art, design, and craft movements.
- To introduce design students to basic methods of inquiry, research, and documentation.
- To enable students to contextualize basic design principles to plural Indian aesthetic identities.
- To enable students to develop visual, written, and oral communication skills.

COURSE CONTENTS

Here's an indicative list of trigger topics based on broad themes. Each theme shall look at how design, function, aesthetics, materials, processes, and techniques have influenced or been influenced by the diversity of place, climate, culture, history, values, and philosophies:

1. **Food**: Philosophy, production, processing, cooking, serving, consumption, waste disposal.
2. **Clothing and accessories**: Everyday, ceremonial, royal, gender, age, body, comfort, identity.

3. **Shelter**: Settlement patterns, form, comfort, services, tribal, vernacular, classical architecture.
4. **Communication**: Language, signs and symbols, text, script, music, dance, theater.
5. **Transport**: Means and methods, every day, royal, ceremonial, accessories, individual, group, mass.

COURSE OUTCOMES

Knowledge & Understanding:

After completing this course, you will be able to:

CO 1: Research and document cultural/ethnic backgrounds, and to discover underlying beliefs, philosophies, and value systems.

CO 2: Contextualize cultural heritage with the historical backdrop of Indian and global art, design, and craft.

Skills and Attributes:

CO 3: Corelate basic design principles such as elements, colour, geometry, materials and techniques with historical and contemporary design, and craft.

CO 4: Organize, articulate, and present information, and ideas through visual, textual, and oral presentations.

Co-relation Course Outcomes (COs) and Program Outcomes (POs)

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

PO/CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Teamwork	Professional Ethics	Sustainable Solution	Local and Global Context	Lifelong Learning

CO 1	2	3	1	3	1	1	0	1	2	1	2	3
CO 2	3	2	2	2	2	1	0	1	3	1	2	3
CO 3	3	1	3	2	2	3	0	1	2	1	2	3
CO4	3	2	3	3	2	2	0	1	3	2	2	3

PREREQUSITES AND MATERIAL

1. Basic drawing skill ,
2. Pencil (2B , 4 B, 6B) Paper (cartridge paper, color , and other types of paper)
3. Color- poster, acrylic, and other
4. Laptop and Camera

REFERENCE BOOKS

Liberal Arts and Sciences: Thinking Critically, Creatively, and Ethically by Christopher A. Ulloa Chaves ED.D.

MATERIAL EXPLORATION-I

Foundation @ SOD

L	T	P	C
0	1	2	2

COURSE BRIEF

The module introduces students to material and technical exploration. This semester the students will explore planar and granular material and understand the possibilities of form exploration with the same while understanding the properties and characteristics of the same. The module is designed to allow each student to pursue a personal direction in their work that may be traditional or non-traditional. With focus on ideation and exploration, the module aims at exposing the basic properties, simple techniques and methods to add/remove material, and how to evolve

new forms using the properties. Through a series of lectures, discussions, exercises, and assignments, students will acquire the fundamental knowledge and skills required for entry into the professional world.

LEARNING OBJECTIVE

Student will learn about the property and characteristics of materials and gain knowledge and skills to work on it by using basic tools and techniques.

COURSE CONTENT

This is entirely a manual process-based module, and only hand tools will be used for carrying out all the exercises. The students will be exposed to:

Planar Material (paper, fabric, etc.)

Granular Material (clay, pop, etc.)

TOOLS

Use of basic hand tools -

- Cutter
- Scissors
- Saw
- Chisel
- File
- Tri angle
- Hammer
- Holders Etc.

TECHNIQUES

- Demo of properties of Materials
- Sample manipulations
- Explanation of each property
- Various methods of addition and removal
- Assignments based on explorations of properties

COURSE OUTCOMES

After completing this course, you will be able to:

Knowledge & Understanding:

- Explain properties of material through manipulation technique. (CO1)

Skills and Attributes:

- Apply knowledge and understanding of material behavior and techniques to create design expression (CO2)
- Demonstrate skillset of working with material and related tools via exploration and manipulation (CO3)

Co-relation Course Outcomes (COs) and Program Outcomes (POs)

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Teamwork	Professional Ethics	Sustainable Solution	Local and Global Context	Lifelong Learning
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	3	0	3	2	2	1	0	0	1	3	2	3
CO 2	3	2	3	3	3	2	0	0	3	2	2	3
CO 3	3	2	3	3	3	2	0	0	2	2	2	3

PREREQUSITES AND MATERIAL

1. Basic drawing skill
2. Material as specified by the faculty
3. Pencil (2B, 4 B, 6B) Paper (cartridge paper, color , and other types of paper)
4. Mask and Apron

REFERENCE BOOKS

1. The Backyard Blacksmith Hardcover - by **Lorelei Sims** , publisher : Crestline book
2. Learners World Clay Moulding Book Clay Tools, AC 073 ASIN B00HJ2VNNA
3. Clay Modeling Books, by **Gurinder**, young learner publications
4. BETWEEN CLAY AND DUST-by : **MUSHARRAF ALI FAROOQI**, publisher : Aleph book company pvt. Ltd.
5. The Potter's Complete Book of Clay and Glazes: A Comprehensive Guide to Formulating, Mixing, Applying, and Firing Clay Bodies and Glazes. by **James Chappell**.
6. The Incredible Clay Book. Publishr : Klutz Press by Sherri Haab (Editor), Laura Torres
7. On the Effects of Gypsum, or Plaster of Paris, as a Manure; Chiefly Extracted from Papers and Letters on Agriculture, by the Agricultural Society in Canada, by **Multiple Contributors**
8. Plaster of Paris and How to Use It, by **Martin Wiener Ware**
9. Plaster of Paris: Techniques from Scratch, by **Reid Harvey**
10. Create Anything With Clay, by Sherri Haab , Laura Torres publisher : Kultz press
11. Plaster of Paris: Techniques from Scratch Paperback – by **Reid Harvey publisher**: Gentle breeze publication

2023-27

Foundation

Year 1

Semester 2

2023-27

SKETCHING AND DRAWING-II

Foundation @ SOD

L	T	P	C
4	0	2	5

COURSE BRIEF

Increasing the level of complexity from previous semester the sketching and drawing- 2, this semester will focus more on learning to gain control over hand movement to achieve the desired result with different mediums on different surfaces. The students shall also work with creativity and imagination to explore and create detailed drawings with play of light and shadow for a context.

LEARNING OBJECTIVES

- Enhances on student's previous learnings of Visual Perception and Spatial Positioning of Figures/ Objects in two dimensions and three dimensions.
- Empower students with the knowledge and skills to observe, explore, experiment and represent their observation while playing with different mediums.
- Display rigor and experimentation while looking at details of light and shadows along with expressions and techniques.

COURSE CONTENTS

This subject is an extension of learning gained in semester I. Having gained the basic skills, the student is now prompted to move ahead, with complex cases, and make complete drawing with details.

- **Nature Drawing:**
  Importance of light and shade and drawing. Impact of changing the surface and medium. Looking at details and bringing aesthetically pleasing compositions
- **Human Drawing:**
  Understand the proportions of body. Looking at human form with details and precision. Looking at human form in relation to another subject/ object.
- **Object Drawing:**
  Form in perspective and in context. Creating images that communicate and ways and means to say it.

COURSE OUTCOMES

Knowledge & Understanding:

After completing this course, you will be able to:

- Reflect an understanding of form and proportions (CO1)

Skills and Attributes:

- Experiment and explore drawing techniques to create aesthetically pleasing compositions. (CO2)
- Illustrate ideas with details and sensitivity. (CO3)
- Communicate ideas effectively through visual representations (CO4)

Co-relation Course Outcomes (COs) and Program Outcomes (POs)

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Teamwork	Professional Ethics	Sustainable Solution	Local and Global Context	Lifelong Learning
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	2	0	3	3	3	3	0	0	1	0	1	3
CO 2	3	2	3	3	3	2	0	0	3	0	1	3
CO 3	3	0	3	3	3	2	0	0	2	2	2	3
CO4	3	1	3	3	3	1	0	0	3	2	1	3

PREREQUSITES AND MATERIAL

- Basic drawing skill
- Pencil (2B, 4B, 6B) Paper (cartridge paper, color , and other types of paper)
- Require few objects and human models for Live sketching

REFERENCE BOOKS

1. Sketching: Drawing Techniques for Product Designers by Koos Eissen(Author), Roselien Steur(Author), BIS Publishers
2. Drawing for Product Designers (Portfolio Skills: Product Design) by Kevin Henry, Laurence King Publishing
3. Perspective and Sketching for Designers by Jessica Newman
4. Jessica Newman and Jack Beduhn, Prentice Hall
5. Freehand Drawing For Architects and Interior Designers by Magali Delgado Yanes
6. Magali Delgado Yanes (Author), Ernest Redondo Dominguez and Maria Fleming Alvarez,

7. Design Drawing by Francis D. K. Ching and Steven P. Juroszek, Wiley
8. How to Draw: drawing and sketching objects and environments from your imagination by Scott Robertson and Thomas Bertling, Design Studio Press
9. Sketching: The Basics by Roselien Steur an Koos Eissen, BIS Publishers
10. Anatomy and Drawing by Victor Perard, Dover Publications
11. Illustration With Markers/Time-Saving Techniques for Design Professionals by John A. Gleason, Whitney Library of Design
12. Rendering with Pen and Ink by Robert W. Gill, W Norton & Co Inc

URL

- https://www.creativebloq.com/features/how-to-draw-animals-people-landscapes
- https://design.tutsplus.com/tutorials/how-to-draw-a-rose--cms-26864
- https://www.thegreatcourses.com/courses/how-to-draw.html
- http://www.floobynooby.com/pdfs/Perspective_Drawing_HandbookJosephDAmelio.pdf
- https://www.pdfdrive.com/human-figure-drawing-books.html

PRINCIPLES OF DESIGN

Foundation @ SOD

L	T	P	C
1	1	2	3

COURSE BRIEF

In this course, which is an extension of design basics learnt in the earlier semester, thrust is given on understanding and learning of principles for visualization. Human eyes follow certain unwritten yet universally true principles. Once understood, these principles are to be thoroughly explored, to create visuals and aesthetically pleasing compositions demonstrating the application of principles.

LEARNING OBJECTIVE

The module introduces the students to

- Create communicative compositions, applying knowledge and understanding of elements and principles of design.
- Gestalt laws and its application.
- Creative thought process, self-exploration, and deriving a final on comparative basis.

COURSE CONTENT

Gestalt Law

Introduction to Gestalt psychology. Gestalt's principles of visualization, these principles in nature, application in creative work of prominent artists/designers

Harmony and Rhythm

Few of the basic principles, underlying the pleasantness of a visual. What is visual harmony and what is visual disharmony? what is the impact of rhythm on a visual? These questions will be answered by a detailed and elaborate demonstration to the students, followed by exploratory assignments to be done by the students.

Emphasis

"Center of Interest." It is about dominance and influence. Most artists put it a bit off center and balance it with some minor themes to maintain our interest. Some artists avoid emphasis on purpose. They want all parts of the work to be equally interesting.

Contrast

Uses contrasting visual concepts. That same Western Kansas "big sky" landscape becomes very dramatic and expressive when a storm builds in the southwest. Principles can grow out of any artistic device that is used to produce an effect on the viewer.

Balance

This is perhaps the most subjective principles of design. A visual looks good if it is well balanced, and if it is not, the eyes tend to reject it as unpleasant. However, it is not the physical balance but the visual balance – the interaction between the positive and negative spaces in a given format. Learning this principle involves going through and analyzing substantial examples.

What is symmetry? What are the different types of symmetry? The discussion would involve examples of symmetry in nature and man-made environment. The exercises will also involve relation between symmetry, asymmetry and balance.

COURSE OUTCOME

Knowledge & Understanding:

After completing this course, you will be able to:

- CO1: Understand fundamentals of principles of design.

Skills and Attributes:

- CO2: Employ visual, material, hand-skills and digital techniques to generate original forms.
- CO3: Implement fundamentals by developing conceptual ability and the necessary skills of creating communicative compositions
  CO4: Observe and explore visual language as a tool of communication

Co-relation Course Outcomes (COs) and Program Outcomes (POs)

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Teamwork	Professional Ethics	Sustainable Solution	Local and Global Context	Lifelong Learning
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	3	0	3	2	2	2	0	0	0	2	2	3
CO 2	3	0	3	2	3	2	0	0	0	2	2	3
CO 3	3	0	3	2	2	2	0	0	1	1	2	3
CO4	3	2	3	3	3	2	0	0	3	2	2	3

PREREQUSITES AND MATERIAL

- Poster color, Black Ink, Black pen, Scale, Markers and Geometry Box.
- Brush(0,2, 4 ,8,) Paper (cartridge paper, color , and other types of paper)
- Laptop or personal computer

REFERENCE BOOKS

1. Design Basics by David A. Lauer Learning.
2. Logic and Design: In Art, Science and Mathematics by Krome Barratt, Green Editorial.
3. Illustrated Elements of Art and Principles of Design by consultant: Gerald F. Brommer, Crystal Productions.
4. Design Elements: Understanding the rules and knowing when to break them by Timothy Samara, Rockport Publishers.
5. Design Elements, Form & Space: A Graphic Style Manual for Understanding Structure and Design by Dennis Puhalla, Rockport Publishers.
6. Universal Principles of Design by William Lidwell, Kritina Holden and Jill Butler, Rockport Publishers.

DESIGN PROCESS

Foundation @ SOD

L	T	P	C
3	2	2	6

COURSE BRIEF

Design is a process. Anyone who wants to get into the field of design, irrespective of the discipline of specialization, needs to get conversant with the basic steps, their relevance, methods and approaches involved in the process of designing. Besides looking at creating visual and design vocabulary, this course will also introduce the methods and give students an overview of the process of design which is essential to understand and appreciate the design development through observation, study, exploration, ideation and perception.

LEARNING OBJECTIVE

- To introduce students to the different stages in the design process – from perception of a problem to generating a solution to the problem through investigation, analysis and synthesis.
- To understand the methodology of the problem solving process.

COURSE CONTENTS

- Analysis and mapping of the design process.
- The morphology of the problem solving process
- Case studies
- Role of creativity in design

COURSE OUTCOMES

Knowledge & Understanding:

After completing this course, you will be able to:

- CO1: Understand the steps invoved in design process.
- CO2: Interpret and analyze visual and textual information to develop perception and ideas for expression.

Skills and Attributes:

- CO3: Design a thoughtful tangible outcome using skill, knowledge and understanding explored in other modules.
- CO4: Document the entire learning process, exploration, progression of design understanding and sequence of design development.
- CO5: Demonstrate engagement with content via reading, researching and participating in classroom discussions and activities.

Co-relation Course Outcomes (COs) and Program Outcomes (POs)

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Teamwork	Professional Ethics	Sustainable Solution	Local and Global Context	Lifelong Learning
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	3	3	3	3	3	1	1	1	1	1	3	3
CO 2	3	3	3	3	3	2	1	2	2	2	2	3
CO 3	3	2	3	2	2	2	1	2	1	2	2	3
CO4	3	3	3	3	3	2	1	2	3	2	2	3
CO5	1	3	2	2	1	2	1	3	2	1	2	3

PREREQUSITES AND MATERIAL

1. Basic drawing skill ,
2. Pencil (2B , 4 B, 6B) Paper (cartridge paper, color , and other types of paper)
3. Color poster acrylic, and other

4. Laptop and Camera

REFERENCE BOOKS

1. Thinking Design by S Balaram
2. The Design Process by Karl Aspelund
3. Thoughts on Design by Paul Rand
4. The Design of Everyday Things by Don Norman
5. Change by Design by Tim Brown
6. Designing for Growth by Jeanne Liedtke

MATERIAL EXPLORATION-II

Foundation @ SOD

L	T	P	C
1	0	2	2

COURSE BRIEF

Material Exploration for this semester will focus on the creating design expression through manipulating and modifying porous and fibrous material like wood to strong, hard and shiny material like metal. With emphasis placed on ideation, and exploration this subject will promote curiosity and an atmosphere conducive to material and technical exploration. Material Exploration aims at exposing the basic properties, simple techniques and methods to add/remove material, and how to evolve new forms using the properties. Through a series of lectures, discussions, exercises, and assignments, students will acquire the fundamental knowledge and skills required for understanding and playing with material.

LEARNING OBJECTIVE

Student will learn about the property and characteristics of materials and also gain knowledge and skills to work on it by using basic tools and techniques.

COURSE CONTENT

This is entirely a manual process-based module, and only hand tools will be used for carrying out all the exercises. The students will be exposed to:

- WOOD (deodar, golden teak, sesame, Sal, rosewood) etc.
- METAL (aluminum, steel,) etc.

TOOLS

Use of basic hand tools -

- saw
- chisel
- file
- drill
- tri angle
- hammer
- planer
- holders
- jointer
- Sander machine etc.

TECHNIQUES

- Demo of properties of Materials
- Sample manipulations
- Explanation of each property
- Various methods of addition and removal
- Assignments based on explorations of properties

COURSE OUTCOMES

After completing this course, you will be able to:

Knowledge & Understanding:

- CO1: Demonstrate an understanding of material properties through manipulation technique.

Skills and Attributes:

- CO2: Demonstrate skillset of working with material and related tools via exploration and manipulation
- CO3: Apply knowledge and understanding of material behavior and techniques to create design expression.

Co-relation Course Outcomes (COs) and Program Outcomes (POs)

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Teamwork	Professional Ethics	Sustainable Solution	Local and Global Context	Lifelong Learning
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	3	0	3	2	2	1	0	0	0	3	2	3
CO 2	3	0	3	3	3	1	0	0	0	2	2	3
CO 3	3	2	3	3	3	2	0	0	2	2	2	3

PREREQUSITES AND MATERIAL

- Basic drawing skill
- Material as specified by the faculty
- Pencil (2B, 4 B, 6B) Paper (cartridge paper, color , and other types of paper)
- Mask and Apron

REFERENCE BOOKS

1. What Wood Is That? A Manual of Wood Identification by Herbert L. Edlin (Author) publisher : Viking adult
2. Understanding Wood: A Craftsman's Guide to Wood Technology by R. Bruce Hoadley publisher: Taunton press
3. Wood: Materials for Inspirational Design, by Chris Lefteri
4. Solid Wood: Case Studies in Mass Timber Architecture, Technology and Design 1st Edition , by Joseph Mayo
5. Wood: Identification and Use, by Terry Potter, Publisher : guild of master craftsmen Nature & Art of Workmanship, by David Pye
6. Creative Metal Forming – by Betty Helen Longhi (Author), Cynthia Eid (Author), publisher :Brynmorgen press
7. The Backyard Blacksmith Hardcover – by Lorelei Sims , publisher : Crestline book

COMPUTER APPLICATIONS

Foundation @ SOD

L	T	P	C
1	0	2	2

COURSE BRIEF

This subject gives an exposure to basic design softwares used in design disciplines. The tools are used extensively in varied industries as well. It is very important to understand how to design graphics as well as how to handle the tools effectively. Through a series of lectures, discussions, exercises, and assignments, students will acquire the fundamental knowledge and skills required for entry into the professional world.

LEARNING OBJECTIVE

Develop necessary digital tools and techniques.

Enhance the techniques of execution of form and content relevant to the field in both digital and print mediums.

Create and manipulate images to use in various contexts.

The learnings will also help in understanding of form - product, spaces, and layouts for print and web.

COURSE CONTENT

Adobe Photoshop

Basic exposures and learning to experiment with various possibilities. Application oriented exercises with actual photographs/images.

- Images in Photoshop and Image Ready (Default images)
- Intro to Tools Selections & Color Models
- Working with Layers
- Transforming & Retouching
- Color & Tonal Adjustments
- Working with Typography

Adobe Illustrator

Basic exposures and learning to experiment with various possibilities. Application oriented exercises to create graphics and sketches for a purpose.

- Graphics creation
- Intro to Tools Selections & Color Models
- Working with Layers
- Transforming & Manipulating
- Grids and layouts
- Working with Typography

COURSE OUTCOME

After completing this course, you will be able to:

Knowledge & Understanding:

- Demonstrate an understanding of tools and techniques used to create effective compositions. (CO1)

Skills and Attributes:

- Create graphics and images using tools and techniques of divergent thinking (CO2)
- Apply basic design concepts – light, color, texture etc to create aesthetically pleasing graphics/images (CO3)

Co-relation Course Outcomes (COs) and Program Outcomes (POs)

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Teamwork	Professional Ethics	Sustainable Solution	Local and Global Context	Lifelong Learning
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO 1	3	0	3	2	2	0	0	0	1	1	2	3
CO 2	3	0	3	3	3	1	0	0	1	1	2	3
CO 3	3	0	3	3	3	1	0	0	1	1	2	3

PREREQUSITES AND MATERIAL

- Basic drawing skill
- Laptop, or personal computer

REFERENCE BOOKS

1. The Adobe Photoshop CS6 Book for Digital Photographers (English) by Scott Kelby
2. Adobe Photoshop CS6 for Photographers: A professional image editor's guide to the relative use of Photoshop for the Macintosh and PC by Martin Evening.
3. Adobe Illustrator for beginners 2021, Hector Grant

Semester 3

Year 2

Product Sketching and Rendering 1

Course Code: SDID 2012
Credit: 3
L-T-P: 1-0-4

1. Course Brief: :

Sketching is the fundamental tool of a Designer. A student communicates his idea to the world by this medium. This course introduces the essential background and basics in Sketching needed for a Designer.

2. Learning Objective:

1. To learn how to draw perfect straight lines, with varying line Intensity.
2. How to use your shoulder and not wrist, and learn to draw long dynamic lines.
3. Learn to Draw Cubes in three different Perspectives using Vanishing Points.
4. Understanding the Use of Auxiliary Vanishing Points.
5. Drawing Cubes at different angles while rotating the Horizon line.
6. Drawing Products using Construction of Cubes as a guideline.

3. Course Contents

- Introduction
  - History
  - Materials and Mediums
- Sketching and Design Phases
- Drawing Approach
- Types of Perspective
  - Blocks
  - Perspective in Lines
  - The View point
  - Shading and Cast Shadow
- Ellipses, Cylinders, Planes and Sections, Sphere
- View point
  - The Informative View point
  - Side view
  - Ellipses and Viewpoints
  - Eye level perspective
  - Birds Eye Perspective
  - Horizon and Eye level perspective
  - Ground level Perspective
- Singular and Multiple Rounding.
- Tubes, Planes and Sections.

4. Course Outcomes

CO1: Students understand the concept of Perspective theory and apply in drawing objects.
CO2: Students develop to see and draw products in a cube grid with a focus on correct proportion, volume and Perspective.

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	0	3	2	0	0	0	0	1	0	0	3	0	3	0
CO2	1	0	2	3	0	0	1	0	1	0	0	2	0	2	0

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. Prerequisites and Materials

- Students should have basic understanding of elements and principles of design.

Reference Books:-

1. Sketching the Basics by Koos Eissen & Roselien Steur
2. Drawing for Product Designers (Portfolio Skills: Product Design) by Kevin Henry, Laurence King Publishing

3. Perspective and Sketching for Designers by Jessica Newman Jessica Newman and Jack Beduhn, Prentice Hall
4. Design Rendering Techniques by Dick Powell.

Web Links:

http://www.theDesignSketchbook.com
https://cargocollective.com/drawthrough
https://www.sketch-a-day.com/
https://www.sketchbook.com/
https://www.artistsnetwork.com/

Online Videos

https://www.youtube.com/watch?v=QNNbpLO4mEI
https://www.youtube.com/watch?v=r-UqGtsjKiU
https://www.youtube.com/watch?v=5BfTmbHS2J8
https://www.youtube.com/watch?v=mbNY51gmTHY

Model Making Techniques

Course Code: SDID 2014
Credit: 2
L-T-P: 1-0-2

1. Course Brief:

A design, once conceptualized and finalized, its details needs to be demonstrated. This is best done by making models. The obvious advantage is to get an accurate idea of the design. Models are often scaled down and are made from cheaper material, involving simple processes, often manual only. It is essential to communicate the exteriors of the new design, and achieve the desired finish.
To gain proficiency in hand modelling, students will be given mini projects to create the models. With the help of various model making tools, student will create their own models for a particular design.

2. Learning Objective:

- To understand scale of model and the type of models used in design process
- To understand various materials used in model making processes
- To know different levels involved in making appearance model / prototype
- To gain skill on making dimensionally perfect models with desirable surface finish

3. Course Content:

- Type of Model: Appearance model, form and fit model, ergonomic model
- Difference between appearance model and prototype, types of prototype
- Exposure to common materials from which models are made: paper, wood, clay, plaster of paris (POP), mount board, plastics, PU-Foam, thermocol etc.
- Exposure to common processes: how to select appropriate material for the model, hand cutting, folding and adhering techniques, simple machining – cutting, turning, drilling, vacuum forming etc.
- Paints and Painting technology, Matte and Glossy finish
- Dimensioning and detailing of appearance models.

4. Course Outcomes

CO1: Students understand the concept of scale and various material as well as levels involved in model making.
CO2: Students will be able to make appearance models and prototypes of new designs.

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	0	3	2	0	3	0	2	1	3	2	2	2	3	1
CO2	2	0	3	3	0	2	1	3	3	3	3	2	0	2	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. Prerequisites and Materials

- Students should have basic understanding of dimensions and adequate amount of patience to do surface treatment of the appearance models.
- Student should not have allergy towards model making materials.

Reference Book:

1. Design and Technology by James Garratt, Cambridge University Press
2. Design and Technology by Colin Caborn, Thomas Nelson Publishers

Online Videos:

- https://www.youtube.com/watch?v=5SWt-TSYD08

- https://www.youtube.com/watch?v=jmNzTZ7MZEI
- https://www.youtube.com/watch?v=xz7Au9lnxMc
- https://www.youtube.com/watch?v=gWk6br5Ngkc
- https://www.youtube.com/watch?v=0Z-cBnH79J4

Applied Ergonomics

Course Code: SDID 2015
Credit: 3
L-T-P: 1-0-4

6. Course Brief:

Ergonomics is the study of human beings while they interact with the surroundings in general and products in specific. Ergonomics has its essence in creating products which are efficient in usability from the user point of view.

This course introduces human factors and its application in product design. It also introduces students to the basic foundation principles of human factors, to develop better products for the user. It encourages developing objective methods of evaluating ergonomic problems and the generation of more human centric design solutions.

7. Learning Objective:

1. To enable student in terms of understanding the role and need of ergonomics in design.
2. The students should be capable to apply the concepts of anthropometry and biomechanics from the early stages of design process.
3. To help students to develop effective design to meet the current/ future need of the end user.

8. Course Contents:

A. Theoretical

1. **Introduction to Ergonomics**
   Definition of Ergonomics; Origin and history of ergonomics; Scope of ergonomics in design; Components of ergonomics
2. **Biomechanics and Physiology**
   What is biomechanics; Human body as a lever; Equilibrium, balance and stability; Centre of Gravity; Work postures; Vertebral column; Musculoskeletal Disorder- types and causes.
3. **Anthropometry**
   What is anthropometry; types of anthropometry; sources of variation in human population; anthropometric principles in design of product and workstation; concept of percentile value of anthropometric data
4. **Visual Ergonomics**
   Human visual processes; lighting; visual demands of a task; visual comfort and safety; optical corrections
5. **User need study**
   Maslow's hierarchical theory of human needs vs Jordan's hierarchy of user needs

B. Practical/Tutorial

Student need to do a project to check their understanding of ergonomics, anthropometric principles. For example they need to redesign any existing hand held product or workstation

9. Course Outcomes

CO1. Understand key concepts and components of ergonomic and its application.
CO2. Understand the principles of biomechanics and Human Physiology in context of design
CO3. Apply the basics of ergonomics, anthropometry and biomechanics in designing workstations

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	1	1	0	0	3	0	0	3	0	3	1	3	0	0
CO2	0	3	1	0	0	3	0	0	3	0	3	1	3	0	0
CO3	2	3	2	2	2	2	1	3	1	2	3	2	0	0	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

10. Prerequisites and Materials

- NA

Reference Books:-

1. Sanders, M. S., & McCormick, E. J. (1998). *Human factors in engineering and design* (p. 22). New York: McGraw-Hill.
2. Salvendy, G. (2012). *Handbook of human factors and ergonomics*. John Wiley & Sons.

3. Bridger, R. (2008). *Introduction to ergonomics*. Crc Press.
4. Pheasant, S., & Haslegrave, C. M. (2016). *Bodyspace: Anthropometry, ergonomics and the design of work*. CRC Press.
5. Karwowski, W., Soares, M. M., & Stanton, N. A. (Eds.). (2011). *Human factors and ergonomics in consumer product design: Uses and Applications*. CRC Press.
6. Karwowski, W. (Ed.). (2001). *International encyclopedia of ergonomics and human factors* (Vol. 3). Crc Press.
7. Bhattacharya, A., & McGlothlin, J. D. (Eds.). (1996). *Occupational ergonomics: theory and applications* (No. 27). CRC Press.
8. Anshel, J. (2002). *Visual ergonomics in the workplace*. CRC Press.
9. Dellerman, N. J., Haslegrave, C. M., & Chaffin, D. B. Working postures and movements. Tools for evaluation and engineering. 2004.
10. Tilley, A. R. (2002). *The measure of man and woman: human factors in design* (Vol. 1). John Wiley & Sons.

Web Links:

1. https://www.youtube.com/watch?v=LAKlmdMHpdE
2. https://www.youtube.com/watch?v=3kVnUqvRJV0
3. https://www.cdc.gov/niosh/topics/ergonomics/default.html
4. https://www.iea.cc/

Online Videos

1. https://www.youtube.com/watch?v=LAKlmdMHpdE
2. https://www.youtube.com/watch?v=HHcK1Zbtvyg
3. https://www.youtube.com/watch?v=vSwH8-MFkKc
4. https://www.youtube.com/watch?v=1GRvasLjPag
5. https://www.youtube.com/watch?v=WLa0bLP8-sE
6. https://www.youtube.com/watch?v=z0xLL8VWQAg

Project 1: Simple Product Design

Course Code: SDPJ 2126
Credit: 5
L-T-P: 1-0-8

11. Course Brief:

Product design is to create a new product to be sold by a business to its customers. Product Design is also the set of properties of an artifact, consisting of the discrete properties of the form (i.e., the aesthetics of the tangible good and/or service) and the function (i.e. its capabilities) together with the holistic properties of the integrated form and function.
This project is a "simple product design" exercise. The students could be given a generic topic to work upon or each student/group can select the project/industrial product for design or redesign. The product must not have complex mechanisms and also should not involves complex electrical and electronics principles. The aim here is to teach the students the basic process followed in design of a simple product. It also takes them through the problem solving stages and approach to creativity and innovation. The deliverables of this project could be report, final model/mock-up and presentation

12. Learning Objective:

4. To make the student understand the nature of simple product.
5. To follow design process to understand the steps involved in product design / development process
6. To collect data to analyse the user requirements and create design concepts to fulfil the basic as well as future need of the user
7. To make appearance model / prototype to validate the design

13. **Course Contents:**

- Understanding simple product and study of simple designs
- The design process
- Need Analysis through user study
- Data collection and research: User, Product and Market
- Concept generation and selection
- Design validation through prototypes / scales appearance model

14. Course Outcomes

CO1: Understand key concepts and components of simple product.
CO2: Understand the design process by collecting data, analyzing the data and making suitable concepts for the user.
CO3: Demonstrate the design validation though appearance model / prototypes.

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	3	0	1	0	2	0	2	0	0	3	2	3	0	0
CO2	3	3	3	3	3	3	2	2	3	3	3	2	2	3	1
CO3	1	0	2	2	1	2	1	1	0	1	0	1	0	1	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

15. Prerequisites and Materials

- Understanding of design elements, principle of design and model making skills.

Reference

All books related to design research & analysis, concept generation & selection and prototyping skills

Web Links:

- https://www.designyourway.net/blog/inspiration/cool-and-innovative-product-design-examples/

- https://www.pinterest.com/KuenChang/product-simple-object/
- https://www.pinterest.com/iantsmith/product-design-ideas/
- https://morewithlessdesign.com/en/product/
- https://speckyboy.com/the-10-golden-rules-of-simple-clean-design/

Online Videos:

- https://www.youtube.com/watch?v=5QN8H0S-AR4
- https://www.youtube.com/watch?v=FbYx8Agg2z0
- https://www.youtube.com/watch?v=3vlvtftDTE0
- https://www.youtube.com/watch?v=NIkg3Ui7ITY
- https://www.youtube.com/watch?v=HN9GtL21rb4
- https://www.youtube.com/watch?v=XRd6Ddn4ZSY

Semester 4

Year 2

Product Sketching and Rendering 2

Course Code: SDID 2023
Credit: 3
L-T-P: 1-1-2

16. Course Brief: :

In continuation with sketching course in the previous Semester, this course focuses on bringing value to the objects we are intending to sketch. It introduces the concept of Shading, Highlights, Shadows, Color etc. It also introduces how the Light Interacts with Objects.
The students are further taught to Render Objects using Markers and Dry Pastels.

17. Learning Objective:

7. Learn to use shading and Understand Different Surface Interaction and Flow in Objects.
8. Learn to cast shadows of Objects w.r.t Light Source.
9. Understand Color Interaction with Objects and render using Markers.

18. Course Contents

- Depth
  - Focal point
  - Silhouette line Weight
  - Direction of shading
  - Cast Shadow
  - Highlights and Shadows
  - Transparency

- Marker Rendering
  - Basic Techniques
  - Infilling Flat Areas
  - Marker Streaking
  - Masking
  - Working to a line
  - Toning and Blending
  - Over coating
  - Highlights and Borders.

- Reflections w.r.t Materials
  - Ground tones and sky tones
- Using Dry Pastels
- Descriptive Drawing

19. Course Outcomes

CO1: Able to Choose a Light Source Direction and shade the Objects.
CO2: Apply Reflections In different Objects w,r,t Materials and be able to Render Objects using Markers

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	0	3	2	0	0	0	0	1	0	0	3	1	3	0
CO2	1	0	2	3	0	0	1	0	1	0	0	2	0	2	0

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20. Prerequisites and Materials

- Perspective and Proportion Basics
- Good line Quality and Intensity.
- Basics of Ellipse orientation in various Perspectives/ Angles.

Reference Books:-

5. Sketching the Basics by Koos Eissen & Roselien Steur
6. Sketching : Drawing Techniques for Product Designers by Koos Eissen and Roselien Steur
7. Drawing for Product Designers (Portfolio Skills: Product Design) by Kevin Henry, Laurence King Publishing
8. Perspective and Sketching for Designers by Jessica Newman Jessica Newman and Jack Beduhn, Prentice Hall

Web Link:

1. https://www.artistsnetwork.com/art-techniques/learning-how-to-draw-with-markers-and-ink/
2. https://www.pinterest.com/evanoene/marker-sketch/
3. https://johnmuirlaws.com/fast-sketching-with-markers/
4. https://mymodernmet.com/best-artist-markers/
5. https://www.sketch-a-day.com/
6. https://www.sketchbook.com/
7. https://www.artistsnetwork.com/

Online Videos:

1. https://www.youtube.com/watch?v=ETrrALapyeU
2. https://www.youtube.com/watch?v=AWRAk8ybKkA
3. https://www.youtube.com/watch?v=qFioJ4ISorg
4. https://www.youtube.com/watch?v=xrzwFKRTxPM
5. https://www.youtube.com/watch?v=WFW4OzNdEjQ
6. https://www.youtube.com/watch?v=OQ440KKb0zw

Form Studies

Course Code: SDID 2024
Credit: 3
L-T-P: 2-1-0

21. Course Brief:

A form of an object/ product refers to its identity in a 3 dimensional space. The form also manifests itself in the tangible aspects in which we perceive an object with our different senses. The Form of a product thus becomes the crux for the Fit, Finish, Function and Value as well as becomes a primary Touchpoint for product- user interaction. This course is an introduction to forms and helps students to understand form as a building block and experiment with the block's manifestation into various possibilities.

22. Learning Objective:

10. To sensitize the students in the essentiality and perception of Forms.
11. Understand various ways of Form creation.

23. Course Contents:

- Grids- Creating 2D shapes from a grid
- Application of Elements and Principles of Design in generation of shape.
- Geometric and Organic Forms
- Cube as a basic unit, Additive and subtractive properties in form generation. Edge and Vertex treatments in a cube.
- Product – Thing, Object and Icon
- Form Development through inspiration and metaphor
- Understand a basic Form Cube/ Cylinder/ Cone etc. Form generation by addition and subtraction of massing.
- Study of forms in nature and abstraction of formal characteristics in basic forms.
- Product form and aesthetics
- Form Transitions- Basic shapes, complex shapes
- Form manipulations- Radii, Edge and Surface manipulations.
- Form its emotion and expression.
- Lifestyle Board, Mood Board, Visual Theme Board

24. Course Outcomes

CO1: Students will be sensitized and gain knowledge about the Visual and tangible perception of Forms.
CO2: Students will understand the various nuances of Form generation.
CO3: Students will learn to work hands on generating Forms from a basic fundamental Unit and able to analyse natural and manmade forms.
CO4: Evolve forms by methods of transitions and manipulations.

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	1	3	1	1	0	0	0	0	0	2	1	3	3	0
CO2	1	o	2	1	0	0	0	0	1	0	0	0	0	3	0
CO3	1	1	2	1	2	0	0	0	1	2	2	1	0	1	3
CO4	1	0	2	1	2	0	1	0	0	2	2	1	0	1	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

25. Prerequisites and Materials

- Students should have basic understanding of Design Elements and Principles of Design.

Reference Books:-

1. *Elements of Design: Rowena Reed Kostellow and the Structure of Visual Relationships* by Gail Greet Hannah, Princeton Architectural Press
2. *Principles of Form and Design* by Wucius Wong, Wiley
3. *Design and Form: The Basic Course at the Bauhaus by Johannes Itten,* Thames & Hudson Ltd
4. *Form, Function & Design* by Paul Jacques Grillo, Dover Publications
5. *Art Forms in Nature* by Ernst Haeckel, Dover Publications
6. Grillo P J - Form, Function, Design – Dover Publication

7. Lidwell W et al: Universal Principle of Design – Rockport.
8. Patric W Jordan – Designing a Pleasurable Product – Contemporary Trends Institute.
9. Coats D, Watches Tell More than Time – Product Design, Information, Quest for elegance. Mc Graw Hill.
10. Clive Grinyer – Smart Design Products That Change Our Lives – Rotovision.
11. Chartlotte & Peter Fiell – Design of The 20th Century - TASCHEN
12. Wucius Wong, Van Nostrand Reinhold Principles Of Form And Design, John Wiley & Sons, New York 1993
13. Gail Greet Hannah – Elements of Design – Rowena Reed Kostellow & The structure of visual relationship – Princeton Architectural Press. NY
14. Paul Zalanski, Mary Pat Fisher - Design Principles And Problems – Harcourt Brace College Publication.
15. Heskett - Industrial Design – Thames Hudson
16. IDSA – Design Secrets: Products - Rockport.
17. Grillo P J - Form, Function, Design – Dover Publication
18. Lidwell W et al: Universal Principle of Design – Rockport.
19. Patric W Jordan – Designing a Pleasurable Product – Contemporary Trends Institute.
20. Coats D, Watches Tell More than Time – Product Design, Information, Quest for elegance. Mc Graw Hill.
21. Clive Grinyer – Smart Design Products That Change Our Lives – Rotovision.
22. Chartlotte & Peter Fiell – Design of The 20th Century - TASCHEN
23. Alan Pipes – Drawings for 3 – Dimensional Design, Concepts, Illustrations, Presentation – Thames and Hudson.
24. Peter Stanyer and Terry Rosenberg – A Fundamental Course in Drawing.
25. Judy Martin – The Encyclopedia of Pastel Techniques - Search Press.
26. Keith West, Watson – Basic Perspective for Artists – Guptill Publications
27. Leatrice eiseman – PANTONE - Guide to Communicating with color – Grafixpress Ltd.
28. David Jury - Reviving the Rule of Typography. – Rotovision

Online videos:

1. https://www.youtube.com/watch?v=Nbv_-4GT3Ag
2. https://www.youtube.com/watch?v=IiPHL0L2Vh8
3. https://www.youtube.com/watch?v=EfO5gLjGu2g
4. https://www.youtube.com/watch?v=LC4vVcu-FWY
5. https://www.youtube.com/watch?v=wRdq-CU3xu8
6. https://www.youtube.com/watch?v=IiPHL0L2Vh8&t=6s
7. https://www.youtube.com/watch?v=dotqGZ3B7Bg
8. https://www.youtube.com/watch?v=-GIKHOmq5tg
9. https://www.youtube.com/watch?v=I_y8zQZOZns
10. https://www.youtube.com/watch?v=S0RKoV8hXxw
11. https://www.youtube.com/watch?v=fmDn9qP8yRo

Materials and Processes

Course Code: SDID 2025
Credit: 3
L-T-P: 2-0-2

1. Course Brief:

Design industry is largely supported and influenced by the materials and processes used in the manufacturing of the final product. The kind of material used in a particular product changes the process used for manufacturing and vice versa.
With advances in technology and availability of various types of new materials, the design and style industry has risen to great extent. Also, the creative value of the products has taken a huge leap. It is, hence, of the utmost importance that a designer should have the basic understanding of various materials and the way they are processed to suit the product. This course will lay the foundation in the arena.

2. Learning Objective

- To understand of natural and manmade materials
- To understand the processes associated with plastics, glass, ceramic, natural materials and metals
- To demonstrate the understanding of material through small class extercises

3. Course Content:

INTRODUCTION TO MATERIAL SCIENCE:
History and fundamentals, types of materials, materials used in the industry, automotive materials, properties of engineering materials, factors affecting the properties, effect of temperature, atmosphere, heat etc.

THERMOPLASTICS, THERMOSETTING PLASTICS, COMPOSITES, AND ELASTOMERS:
Types, specific needs, material properties/characteristics, uses, manufacturing process, various reinforced composites, hybrid composite, adhesives, concrete, vulcanisation of rubber.

PROCESS OF SELECTION & APPLICATIONS OF PLASTICS FOR ENGINEERING & CONSUMER PRODUCTS:
Factors affecting the selection of material, properties of plastics, types of plastics, forming, fabricating and moulding processes, deformation, applications, design limitations and potentials of plastics and their moulding processes, significance of materials and their form in structural strength of products, influence of materials and processes on product aesthetics.

CERAMICS AND GLASS:
Properties, nature of materials, types, special applications in product and vehicles.

NATURAL MATERIALS:
Wood, bamboo, cane, leather, fabric, jute and paper and their use in product, material processing, types.

METALS-FERROUS AND NON-FERROUS

Classification, types, steels, prominent metals and their alloys, Indian Standard codes, applications in product design industry.

SHEET METAL GRADES and WORKING PROCESSES

Introduction to grades, types of grades (O, D, DD, EDD), grading standards, grading requirements and uses. Blanking, piercing, lancing, forming, hemming, drawing

4. Course Outcomes

CO1: To use appropriate materials for designs

CO2: To suggest appropriate processes for new designs so that function is proper & cost is less.

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	2	1	3	0	0	0	0	0	3	3	0	2	1	0
CO2	2	2	1	3	2	1	0	0	2	3	3	0	1	3	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. Prerequisites and Materials

- NA -

Reference Books:-

1. Manufacturing Processes for Design Professionals by Rob Thompson, Thames & Hudson

2. Materials and Process Selection for Engineering Design, Second Edition by Mahmoud M. Farag, CRC Press
3. Industrial Design: Materials and Manufacturing Guide by Jim Lesko, Wiley
4. Elements of Workshop Technology by Samir Kumar Hajra Choudhary, Media Promoters & Publishers Pvt Ltd
5. Workshop Technology by W. A. J. Chapman, Routledge
6. Manufacturing Processes for Design Professionals by Rob Thompson, Thames & Hudson
7. Materials and Process Selection for Engineering Design, Second Edition by Mahmoud M. Farag, CRC Press
8. Industrial Design: Materials and Manufacturing Guide by Jim Lesko, Wiley

Web Links:

1. https://practicalaction.org/material-information-product-design
2. https://www.tandfonline.com/doi/pdf/10.1080/14606925.2017.1353060
3. http://www.polynet.dk/lenau/euromat2001.pdf
4. https://www.pinterest.com/warrenginn/industrial-design-materials-and-processes/
5. http://www-materials.eng.cam.ac.uk/mpsite/
6. https://www.imetllc.com/training-article/materials-selection-design-requirements/

Online Videos

1. https://youtu.be/udM9CrT38AM
2. https://www.youtube.com/watch?v=WHMgK40LCSM
3. https://www.youtube.com/watch?v=KheLbXkOF_U
4. https://www.youtube.com/watch?v=31kTR_xnxCo
5. https://www.youtube.com/watch?v=7OKf6iEJr7c
6. https://www.youtube.com/watch?v=2hqpMm0irJE
7. https://www.youtube.com/watch?v=3uIMhAPNzjg
8. https://www.youtube.com/watch?v=L5s0QsNbrB0&list=PLo1Z_v81F3c4TINP_ZpaPacZpNI_G-Ebw
9. https://www.youtube.com/watch?v=OkPHVTQrpRI&index=2&list=PLo1Z_v81F3c4TINP_ZpaPacZpNI_G-Ebw
10. https://www.youtube.com/watch?v=43N44ICyuEU&index=4&list=PLo1Z_v81F3c4TINP_ZpaPacZpNI_G-Ebw
11. https://www.youtube.com/watch?v=OJ-MpM2Ui2E

Visual Communication

Course Code: SDID 2026
Credit: 3
L-T-P: 3-0-0

1. Course Brief:

Visual Communication is a topic that prepares the student to use various tools of communication. Combined with the other subjects, this topic specifically enhances the visual communication skills of the design student. The most emphasis is given to the matter of the design work rather than the process. The outcome of the various projects and sub topics is essentially in digital or print form of the final desired output. The output desires in training various software related to design industry. Visual communication is very important to express, present and create portfolio. In this module, the student prepares a comprehensive data of all the learning he has undergone earlier, since joining. This is done in form of a comprehensive document (digital and hard copy). Based on the learning from professional documentation, a student will prepare a portfolio suitable for industrial requirements.

2. Learning Objective

Students build and refine their portfolios to a professional level and learn the process of preparing for life after school. This module will challenge you to use all your editing, typographic skills to present your design work in an articulate manner both in print and online. During the module, you will be asked to research, redo, and refine your skills of presentation and clarity.

3. Course Content:

- How to categorize matter (sequence, visuals, text etc.)
- Grid, Layout and its importance
- Necessary elements of a good document
- Page design
- Preparing a dummy
- Typography and its usage in visual design

4. Course Outcomes

CO1: Students will learn the ability to create visual representations through applying basic visual communication principles in grids, layout and typography to better organize and visually structure the information treatment.

CO2: Students will learn how to use appropriate visual tools creatively to professionally communicate important and interesting information in a timely manner to a well-defined audience.

CO3: Students will make a design portfolio to showcase his/her own designs.

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	2	2	1	0	0	0	0	0	0	2	2	0	1	0

CO2	3	2	3	2	2	0	0	0	2	0	2	2	1	2	0
CO3	3	2	3	3	3	0	0	0	2	0	3	2	3	3	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. Prerequisites and Materials

- Basic understanding of Photoshop and other Graphic Software
- Laptop, or personal computer

Reference Books:-

1. Design: Portfolio by Welsh Craig
2. Building Design Portfolios by Eisenman Sara
3. The Graphic Designer's Guide to Portfolio Design by Debbie Rose Myer
9. Carter, R., Meggs, P. B., & Day, B. (2011). *Typographic design: Form and communication*. John Wiley & Sons.
10. Craig, J., & Scala, I. K. (2012). *Designing with type: the essential guide to typography*. Watson-Guptill.
11. Lankow, J., Ritchie, J., & Crooks, R. (2012). *Infographics: The power of visual storytelling*. John Wiley & Sons.
12. Wheeler, A. (2017). *Designing brand identity: an essential guide for the whole branding team*. John Wiley & Sons.
13. Yau, N. (2011). *Visualize this: the Flowing Data guide to design, visualization, and statistics*. John Wiley & Sons.
14. Zeegen, L. (2005). *The fundamentals of illustration*. Ava Publishing.
15. Swann, A. (1989). How to understand and use GRIDS.

Web Links:

1. https://uxdesign.cc/new-to-design-edafa32b776c
2. http://www.idc.iitb.ac.in/resources/dt-july-2009/grid.pdf

Online Videos:

1. https://www.youtube.com/watch?v=r7R1wD20Up0
2. https://www.youtube.com/watch?v=lKqqA4fCDzA
3. https://www.youtube.com/watch?v=Bmu7wRtlrrY
4. https://www.youtube.com/watch?v=ppuPSGdpHt8
5. https://www.youtube.com/watch?v=kxtgSRUwbUM
6. https://www.youtube.com/watch?v=vQt5h0F_LKI

7. https://www.youtube.com/watch?v=312tfNnh2Ac
8. https://www.youtube.com/watch?v=hqYIe5Y76oY
9. https://www.youtube.com/watch?v=TwYKwaEjJd4

Project 2: Lifestyle Product Design

Course Code: SDPJ 2133
Credit: 5
L-T-P: 3-1-2

2. Course Brief:

Lifestyle is expressed in both work and leisure behavior patterns and in activities, attitudes, interests, opinions, values, and allocation of income of individuals. It also reflects people's self image or self concept; the way they see themselves and believe they are seen by the others. The products which enhances or balances the lifestyle of the user is called “Lifestyle Products”. Products are the need satisfying offering from an individual or an organization. The lifestyle is surrounded by different types of need like basic need, future need and exciting need.

Back in the bad old days it was very easy to identify a "lifestyle product" because they always sounded like something extraterrestrial. Clock radios, boom boxes, portable cassette players, and portable AM radios are all prime examples of what used to be called "lifestyle products." In every case the primary goal of a lifestyle device was ergonomic - to perform a particular task. But now, due to the intervention of new materials, manufacturing process and tools like IOT, the lifestyle products are an integral part of our society. These products include the relevant visual language and logotype functioning in the best possible manner. The positioning as well as the designing strategy in place will provide the perfect brand look of corporate. This is done with appropriate guidelines of graphics and excellent artwork in place with comprehensive expertise of design.

In this course the student has to select a particular lifestyle and propose suitable design to those users through user research and need/want analysis.

2. Learning Objective

1. To understand the lifestyle of the user in different social and geographical regions
2. To understand the need vs want comparison to justify product specifications
3. To propose suitable design solutions for particular user lifestyle

3. Course Content:

- What is lifestyle and definition of lifestyle products
- User need and user expectations
- Different Types of Need: Basic Need, Performance Need, Future Need and exciting Need
- Need vs Want
- Balance of aesthetics, ergonomics and practicality in lifestyle product design.

4. Course Outcomes

CO1: Understand key concepts and components user lifestyle and the products around it.
CO2: Understand need vs want and propose design solution to meet user expectations.

CO3: Demonstrate the design validation though appearance model / prototypes.

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	0	0	0	0	0	0	3	0	0	1	2	1	0	0
CO2	3	3	3	3	3	3	3	1	3	3	3	1	3	3	0
CO3	2	1	2	3	1	2	0	1	2	1	1	2	1	2	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. **Prerequisites and Materials**
   - Design Research Methodology
   - Project 1: Simple Product Design

Reference

All books related to life style, design research & analysis, concept generation & selection and prototyping skills

Web Links:

- https://www.designyourway.net/blog/inspiration/cool-and-innovative-product-design-examples/

- https://www.pinterest.com/KuenChang/product-simple-object/
- https://www.pinterest.com/iantsmith/product-design-ideas/
- https://morewithlessdesign.com/en/product/
- https://speckyboy.com/the-10-golden-rules-of-simple-clean-design/

Advance Ergonomics

Course Code: SDID 2021P
Credit: 2
L-T-P: 2-0-0

26. Course Brief:

Ergonomics is the study of human beings while they interact with the surroundings in general and products in specific. Ergonomics has its essence in creating products which are efficient in usability from the user point of view.

The purpose of ergonomics is to improve the overall system performance by improving human and product interaction. This course aims at developing an advanced understanding of the subject ergonomics, covering the more advanced and research oriented issued like human emotion etc.

27. Learning Objective:

8. Usability testing of a product is an important part of design process. This course will enable the students in that.
9. Students should be capable of applying the concepts of displays and controls in designing workstations.
10. To help the students in understanding the end-user in terms of human errors, safety, risk and accidents.

28. Course Contents:

C. Theoretical

1. Product Usability

Product usability and its background; stages of user interface evaluation; steps of usability testing

2. Product Emotion

Emotion; theories of emotion; models of product emotion

3. Accidents and Safety

Definition; Theories of Accident Causation; definition of risk; risk evaluation; warnings

4. System Design

Definition of system; steps in designing a work system; sociotechnical systems

D. Practical/Tutorial

The project work will check the student's understating of the module. E.g. assess the usability of an existing or redesigned product using standard methods

29. Course Outcomes

CO1. Understand concepts of cognitive ergonomics.

CO2. Apply the basics of ergonomics in system design

CO3. Able to test the usability of an existing or a redesigned product

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	1	1	0	0	3	0	0	3	0	3	1	3	0	0
CO2	0	3	1	0	0	3	0	0	3	0	3	1	3	0	0
CO3	2	3	2	2	2	2	1	3	1	2	3	2	0	0	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

30. Prerequisites and Materials

- Understanding of fundamental concepts of ergonomics, anthropometry, biomechanics.
- Need to have basic understanding of the methodologies of primary and secondary data collection techniques.
- Knowledge of analysis and representation of data

Reference Books:-

11. Sanders, M. S., & McCormick, E. J. (1998). *Human factors in engineering and design* (p. 22). New York: McGraw-Hill.
12. Salvendy, G. (2012). *Handbook of human factors and ergonomics*. John Wiley & Sons.
13. Bridger, R. (2008). *Introduction to ergonomics*. Crc Press.
14. Pheasant, S., & Haslegrave, C. M. (2016). *Bodyspace: Anthropometry, ergonomics and the design of work*. CRC Press.

15. Karwowski, W., Soares, M. M., & Stanton, N. A. (Eds.). (2011). *Human factors and ergonomics in consumer product design: Uses and Applications*. CRC Press.
16. Karwowski, W. (Ed.). (2001). *International encyclopedia of ergonomics and human factors* (Vol. 3). Crc Press.
17. Bhattacharya, A., & McGlothlin, J. D. (Eds.). (1996). *Occupational ergonomics: theory and applications* (No. 27). CRC Press.
18. Anshel, J. (2002). *Visual ergonomics in the workplace*. CRC Press.
19. Dellerman, N. J., Haslegrave, C. M., & Chaffin, D. B. Working postures and movements. Tools for evaluation and engineering. 2004.
20. Tilley, A. R. (2002). *The measure of man and woman: human factors in design* (Vol. 1). John Wiley & Sons.

Web Links:

1. https://www.codecademy.com/articles/what-is-product-usability
2. http://www.idc.iitb.ac.in/academics/Course_pdf/UE_Research_Paper_Study_Product_Usability%20Development_Anirban_Maiti_156130003.pdf
3. https://medium.com/symsoft/five-usability-factors-that-make-products-usable-573657edc9f2
4. http://www2.uiah.fi/projekti/metodi/168.htm
5. https://www.interaction-design.org/literature/topics/usability
6. https://www.cdc.gov/niosh/topics/ergonomics/default.html
7. https://www.iea.cc/
8. http://members.upc.nl/g.haan24/articles/chapter1.html
9. https://oshwiki.eu/wiki/Cognitive_ergonomics
10. https://www.interaction-design.org/literature/topics/cognitive-ergonomics

Online Videos:

1. https://www.youtube.com/watch?v=LAKlmdMHpdE
2. https://www.youtube.com/watch?v=3kVnUqvRJV0
3. https://www.youtube.com/watch?v=4uBx84yrBHA&t=5s
4. https://www.youtube.com/watch?v=UJ74AR-Etuc
5. https://www.youtube.com/watch?v=7gKjmDzhwgc
6. https://www.youtube.com/watch?v=BrVnBdW6_rE
7. https://www.youtube.com/watch?v=3FHkf_h6-No
8. https://www.youtube.com/watch?v=dBf6BTX1bmM
9. https://www.youtube.com/watch?v=73zfbMmXlPk
10. https://www.youtube.com/watch?v=aITdRU-iyBc

Product Presentation

Course Code: SDID 2022P
Credit: 2
L-T-P: 2-0-0

31. Course Brief:

Product presentation is a function carried out by a variety of disciplines, from designers, sales, product development, marketing, training etc. Presentations can take place within small meeting environments or even in front of Interview panel.

Developing the skills and knowledge to produce effective presentation can make all the difference between getting a job, getting a product to market, and effectively explaining about the product or service. Students explore every stage of preparation from research, compiling data, design of the presentation and delivery.

32. Learning Objective:

- Students will learn how to make essential points from a product and its background to make a convincing story and presentation.
- Students will learn where and how to pitch a presentation
- Students will learn how to adjust the presentation according to the audience.

33. Course Contents:

E. Theoretical

- How important is storytelling for designers
- Use of Infographics in order to make meaning out of complex data
- Representing surface textures and material finishes.
- Representing transparency and translucency.
- Competence with a set of skills for sketching and representing objects in two dimensions using software and digital media.
- How to make persuasive presentations in order to make a better connect with the audience.

F. Practical/Tutorial

A student will have to take up a small project and make a convincing and persuasive presentation which can help in communicate the real story and the features of the selected project or product.

34. Course Outcomes

CO1: Students will gain knowledge about how storytelling is important to make a better communicative presentation

CO2: Students will learn how to handle the complex data within a project and present it simply and easy to understand for the audience.

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	2	2	0	0	0	0	0	2	0	0	1	1	0	0
CO2	1	0	2	0	0	2	0	0	3	0	0	1	1	3	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

35. Prerequisites and Materials

- Students need to have basic knowledge about the selected product or the project.
- Students should have a prior knowledge of the application used to make the digital presentation.
- Students should have a basic knowledge about the data analysis to be used to handle the information gathered for the research of the project.

Reference Books:-

16. HBR Guide to Persuasive Presentations By Nancy Duarte
17. Infographics: The Power of Visual Storytelling
18. Stories that Move Mountains: Storytelling and Visual Design for Persuasive Presentations
19. The Art of Explanation: Making your Ideas, Products, and Services Easier to Understand
20. Start with Why: How Great Leaders Inspire Everyone to Take Action
21. Contagious: Why Things Catch On

Web Links:

11. https://www.inc.com/allison-goldberg-jen-jamula/5-ways-to-give-a-presentation-that-no-one-will-ever-forget.html
12. https://buffalo7.co.uk/create-awesome-product-presentations/
13. https://www.forbes.com/
14. https://brooksgroup.com/sales-training-blog/7-tips-using-storytelling-sales-presentations
15. https://explaineverything.com/9-business-storytelling-tips-guide-next-presentation/
16. https://blog.slideshare.net/2015/09/14/how-to-tell-great-stories-during-presentations
17. https://blog.prototypr.io/dear-product-managers-learn-how-to-tell-great-stories-5a8246c960bc

Online Videos:

1. https://www.youtube.com/watch?v=w6PXak4IIxs&t=615s
2. https://www.youtube.com/watch?v=U6H5j3FklHA
3. https://www.youtube.com/watch?v=BSxg87CoOu4
4. https://www.youtube.com/watch?v=rOGAJwm3n_M

3D Computer Application

Course Code: SDID 2029P
Credit: 2
L-T-P: 2-0-0

36. Course Brief:

Computer-aided design (CAD) is the use of computers (or workstations) to aid in the creation, modification, analysis, or optimization of a design. CAD software is used to increase the productivity of the designer, improve the quality of design, improve communications through documentation, and to create a database for manufacturing. CAD output is often in the form of electronic files for print, machining, or other manufacturing operations.

This course introduces students to various techniques to translate their ideas in sketch forms into models, with details in order to make realistic representation and communicate effectively. Various modeling software will be used in this course ranging from 2D representation software to solid parametric software (Photoshop, Rhinoceros, and Fusion etc.) and rendering software like Key shot.

37. Learning Objective:

- A series of representative models with different approaches to represent the Idea.
- Understanding of the basic manufacturing techniques, which is kept in mind while translating the idea into a 3D model.

38. Course Contents:

G. Theoretical

- Basic knowledge of the tools within the software
- Salient features
- A brief history of the software, acceptability,
- Possibilities and limitations

H. Practical/Tutorial

A student has to learn basic tools of the software and use them in making representative images of few selected products. They have to replicate the existing product through realistic representations using 2D tools like (Photoshop) and 3D tools like Rhinoceros, Fusion360 and Key shot.

39. Course Outcomes

CO1: Students will gain knowledge basic tools in various 2D and 3D tools
CO2: Students will learn the step by step process of creating communicative and realistic images using different mediums (e.g. 2D and 3D software)
CO3: Students will strengthen their observation skills and understand the importance of the details required in the product representation which make them realistic.

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	0	0	1	0	0	1	0	0	0	2	1	0	0	0
CO2	1	0	1	1	0	0	0	0	0	0	0	1	0	1	0
CO3	0	0	1	0	0	0	2	0	1	0	0	2	0	2	1

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

40. Prerequisites and Materials

- Students are required to have observed the selected product in detail so that they can replicate through digital tool.

Reference Books:-

22. CAD/CAM/CIM by P. Radhakrishnan, S. Subramanyam
23. AutoCAD 2013 and AutoCAD LT 2013 Bible: The Comprehensive, Tutorial Resource byEllen Finkelstein
24. AutoCAD 2013 for Engineers and Designers by Sham Tickoo, Anurag
25. AutoCAD 2013 For Dummies by David Byrnes, Bill Fane
26. Yau, N. (2011). *Visualize this: the Flowing Data guide to design, visualization, and statistics*. John Wiley & Sons.
27. Zeegen, L. (2005). *The fundamentals of illustration*. Ava Publishing.

Web Link:

1. https://www.scan2cad.com/cad/cad-product-design/
2. https://www.designtechcadacademy.com/knowledge-base/introduction-to-cad
3. https://www.astcad.com.au/cad-importance-in-product-development/
4. https://www.lopol.org/article/advantages-and-disadvantages-of-computer-aided-design-cad-over-manual-drafting
5. https://www.rhino3d.com/tutorials
6. https://www.autodesk.com/products/fusion-360/get-started

Online Video:

1. https://www.youtube.com/watch?v=5jguvBRZsFk
2. https://www.youtube.com/watch?v=AF1BvkptT0E
3. https://www.youtube.com/watch?v=seLTjhGYHro
4. https://www.youtube.com/watch?v=QwpB2uoOfUc
5. https://www.youtube.com/watch?v=c7OlPj2K3Po
6. https://www.youtube.com/watch?v=aQ9R6Q-IsZI
7. https://www.youtube.com/watch?v=b_6IeC548w4&list=PLNMdG2-zY2yGhYqBYUJgUDvWrk2ttzBl8

Professional Documentation

Course Code: SDID 2027P
Credit: 2
L-T-P: 2-0-0

41. Course Brief:

One of the most important parts of research project is being able to communicate the findings effectively. Without effective communication, even a very interesting, competent and relevant piece of research is hollow.

This course deals with the methods and steps for effective documentation of design projects.

42. Learning Objective:

11. Identify the relevant information of a design project
12. Collect and organise the information in a simple yet effective approach

43. Course Contents:

I. Theoretical

- Components of a design document
- Understanding of fonts and layout
- Examples of design documents

J. Practical/Tutorial

Students have to document their finished design projects

44. Course Outcomes

CO1. Students will be able to identify key and relevant information in a design process

CO2. Students will be able to write simple, concise and effective design document for their projects

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	1	3	0	0	0	0	3	0	0	3	1	1	0	0
CO2	1	0	1	1	0	0	0	0	3	0	0	1	0	1	0

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

45. Prerequisites and Materials

- NA

Reference Books:-

21. Hillary Collins, Research Methods: How to conduct design research for the creative industries, AVA Publishing SA 2010
22. Coffey, A. (1996) Making Sense of Qualitative Data: Complimentary Research Strategies. Sage
23. Yin, R.K. (1994) Case Study Research. Sage

Web Links:

18. https://designmodo.com/product-design-process-1/
19. https://www.intelligaia.com/6-benefits-to-design-documentation.php
20. http://www.csun.edu/~shan/comp696-698/Resources/Thesis-Outline-Guide-rev1.pdf

Online Videos:

1. https://www.youtube.com/watch?v=w-vvrcQdpZQ
2. https://www.youtube.com/watch?v=r6ZVGBQYNXE

Semester 5

Year 3

Product Styling

Course Code: SDID 3014
Credit: 3
L-T-P: 2-1-0

46. Course Brief:

As the students are already been exposed to form generation using transition exercises between various shapes in different planes. At the same time they are trained to understand the anatomy of a product or service. During this course students will be made to understand the various parameters which govern the overall outlook of a product. Be it the Brand guideline of a particular manufacturer, the Usage Context, Cultural context, Techno-Aesthetic details, Price segment and various other parameters which affect the surface as well as the intrinsic value of a product.

47. Learning Objective:

12. To understand the contextual approach towards the product appearance.
13. To learn elements of visual design and aesthetics design principles
14. To learn the principles and the analytical vocabulary to express.
15. To understand the DNA of a product in particular context.
16. Understanding the schematic function of the product
17. Identify User touch points and surfaces requiring Visual Design and essential technical constraints
18. Understanding Business requirements, Branding aspects and Customer aspirations
19. Preparation of a strategy for product styling
20. Conceptualizing forms through sketching

48. Course Contents:

K. Theoretical

- Product Semantics
- Elements of Form
- Characteristics of various forms
- Form as an element of communication

L. Practical/Tutorial

A student has to study and analyze a brand or a personality and take out the essentials in terms of external and intrinsic characters and apply them on a chosen product or service and iterate to come up with overall new outlook of the same product.

49. Course Outcomes

CO1: Students will gain knowledge about elements of form, texture, Color and fundamentals of visual design principles
CO2: Students will learn the contextual approach towards the form generation, Surface treatment.
CO3: Students will learn how form impacts the communication of the product.

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	2	1	3	0	0	0	2	0	0	3	0	3	0	0
CO2	3	3	2	1	1	0	0	1	0	0	1	0	0	3	0
CO3	0	1	2	1	1	0	0	1	0	0	1	0	0	0	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

50. Prerequisites and Materials

- Students should have basic understanding of elements and principles of design.
- Basic understanding of form generation.
- Analytical skills in order to understand the impact of various parameters on products appearance.

Reference Books:-

28. Emotional Design: Why We Love (or Hate) Everyday Things by Author Don Norman

29. The Pocket Universal Principles of Design: 150 Essential Tools for Architects, Artists, Designers, Developers, Engineers, Inventors, and Makers by William Lidwell
30. Designing Pleasurable Products by Patrick W. Jordan
31. Designing for Emotions by Aarron Walter
32. Influence - The Psychology of Persuasion by Robert B. Cialdini
33. Elements of Design: Rowena Reed Kostellow and the Structure of Visual Relationships by Gail Greet Hannah, Princeton Architectural Press
34. Principles of Form and Design by Wucius Wong, Wiley
35. Design and Form: The Basic Course at the Bauhaus by Johannes Itten, Thames & Hudson Ltd
36. Form, Function & Design by Paul Jacques Grillo, Dover Publications
37. Art Forms in Nature by Ernst Haeckel, Dover Publications

Web Links:

21. https://pdfs.semanticscholar.org/fca9/5913046e73c2e754b5136798bac49846de73.pdf
22. https://blog.bynder.com/en/psychology-behind-brands/
23. https://www.bresslergroup.com/expertise/product-brand-language/
24. https://www.ideo.com/post/envisioning-products-as-holistic-experiences

Design Research Methodology

Course Code: SDID 3026
Credit: 2
L-T-P: 2-0-0

51. Course Brief:

Research is an essential part of any design project. The students will require conducting research during different parts. The research outcome is either used in documentation or for conceptualizing a new product. Students need to be aware of different methodologies for conducting research.

This course will introduce to the ides of qualitative research broadly and ethnographic research specifically. Ethnography is a way to explore the diverse human behavior, which in turn helps in strengthening the design concepts.

52. Learning Objective:

13. Discover new and creative approaches for data collection and develop perspectives on when to use these methods in practice.
14. Compare different primary research methods
15. Learns how to analyse and make sense of the qualitative data, collected through primary research

53. Course Contents:

M. Theoretical

6. Definition and types of Research
Definition of research; Types of Research methodologies; examples of different research methodologies

7. Primary and Secondary Research
What is primary and secondary Research; reliability and validity of sources of secondary data;

8. Methods for primary data collection
Observation; interviews; questionnaires; focus groups

9. Analysis of Data
Basic statistical tools; qualitative data analysis techniques; representation of data

N. Practical/Tutorial

Students will have to design and carry out ethnographic study on any relevant topic and present the findings by properly analyzing and representing the data collected

54. Course Outcomes

CO1: Students will be able to define a research question and justify the methods
CO2: Apply the methods and study the defined problem
CO3: Analyze the research data and draw insights

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	3	1	2	0	2	0	2	1	0	3	1	3	0	0
CO2	1	2	1	0	0	1	0	1	0	1	2	0	2	1	0
CO3	1	2	0	0	0	1	0	1	0	1	2	0	2	1	0

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

55. Prerequisites and Materials

- NA

Reference Books:-

24. Saunders, Lewis &Thornhill (2003) Research Methods for Business Students .Pearson
25. Blaxter, L. and Hughes, C. (1996) How to Research.
26. Burns, R. B. (2000) Introduction to Research Methods. Sage.
27. Bell, J. (1997) Doing your Research Project: a guide for first-time researchers in education. Open University Press.
28. Coffey, A. (1996) Making Sense of Qualitative Data: Complimentary Research Strategies. Sage.
29. Dey, I. (1993) Qualitative Data Analysis. Routledge.
30. Denzin, N.K. and Lincoln, Y.S. (eds.) (1994) Handbook of Qualitative Research. Sage.
31. Mason, J. (1996) Qualitative Researching. Sage.
32. Oppenheim, A.N. (1992) Questionnaire Design: Interviewing and Attitude Measurement. Pinter New Edition.

33. Yin, R.K. (1994) Case Study Research. Sage.

Web Links:

25. https://podcasts.ox.ac.uk/keywords/ethnography
26. https://journals.openedition.org/lectures/18975

Online Videos:

1. https://www.youtube.com/watch?v=PDjS20kic54
2. https://www.youtube.com/watch?v=GaSmD308H0I
3. https://www.youtube.com/watch?v=yadP5qcxlns
4. https://www.youtube.com/watch?v=pQ4RAHXtvS0&list=PLirEzjzoHKvxaX8zZuFUSAi4jdukeexwx
5. https://www.youtube.com/watch?v=5R0b_oXH2BM

Project 3: Display and Control

Course Code: SDPJ 3131
Credit: 5
L-T-P: 1-0-8

56. Course Brief:

The communication between man and machine has to be very efficient and design plays a very important role in this. The controls facilitate man to give commands to the machine whereas display denotes communication from machine to man. With the growing use of electronic gadgets in our life, this aspect is all the more important. In extreme cases (bad design of cockpit) faulty design can prove fatal also. Ergonomics plays a vital role in design of display and controls.

57. Learning Objective:

16. Understand the information input and processing models in humans
17. Understand the display and control interface

58. Course Contents:

O. Theoretical

5. **Information Input and Processing**
   Information processing model; mental models; cognitive system;
6. **Display and Control**
   Types of displays and control; control and display compatibility; design consideration for displays and controls.
7. **Human Error**
   The human errors; Errors of omission; Errors of commission; Sequence errors; Timing errors; dealing with human errors

P. Practical/Tutorial

Students need to undertake a project work wherein they will select a product/machine and analyze existing system, mostly in terms of control display compatibility, and offer solution or redesign concepts. Finally they need to document the project.

59. Course Outcomes

CO1: Students will be able to evaluate and model the human information input and processing
CO2: Students will be able to identify design issues in displays and controls interface and redesign it.

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	3	1	2	1	0	0	2	1	0	3	0	3	1	0
CO2	2	2	3	2	1	1	0	2	2	2	3	0	1	2	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

60. Prerequisites and Materials

- Students should have basic understanding of Ergonomics, User Research Methods and Data Analysis techniques.

Reference Books:-

34. Sanders, M. S., & McCormick, E. J. (1998). *Human factors in engineering and design* (p. 22). New York: McGraw-Hill.
35. Salvendy, G. (2012). *Handbook of human factors and ergonomics*. John Wiley & Sons.
36. Bridger, R. (2008). *Introduction to ergonomics*. Crc Press.
37. Pheasant, S., & Haslegrave, C. M. (2016). *Bodyspace: Anthropometry, ergonomics and the design of work*. CRC Press.
38. Karwowski, W., Soares, M. M., & Stanton, N. A. (Eds.). (2011). *Human factors and ergonomics in consumer product design: Uses and Applications*. CRC Press.
39. Karwowski, W. (Ed.). (2001). *International encyclopedia of ergonomics and human factors* (Vol. 3). Crc Press.

40. Bhattacharya, A., & McGlothlin, J. D. (Eds.). (1996). *Occupational ergonomics: theory and applications* (No. 27). CRC Press.
41. Anshel, J. (2002). *Visual ergonomics in the workplace*. CRC Press.
42. Dellerman, N. J., Haslegrave, C. M., & Chaffin, D. B. Working postures and movements. Tools for evaluation and engineering. 2004.
43. Tilley, A. R. (2002). *The measure of man and woman: human factors in design* (Vol. 1). John Wiley & Sons.

URL:-

1. https://www.designingforhumans.com/idsa/display_and_control_design/
2. https://journals.sagepub.com/doi/pdf/10.1177/0020294015569264

Biomimicry

Course Code: SDID 3027P
Credit: 3
L-T-P: 2-0-2

61. Course Brief:

Humans are clever, but without intending to, we have created massive sustainability problems for future generations. Fortunately, solutions to these global challenges are all around us. Biomimicry is an approach to innovation that seeks sustainable solutions to human challenges by emulating nature's time-tested patterns and strategies. Biomimicry is learning from and then emulating nature's forms, processes, and ecosystems to create more sustainable designs. Biomimicry or biomimetic is the examination of nature, its models, systems, processes, and elements to emulate or take inspiration from in order to solve human problems. The term biomimicry and biomimetic come from the Greek words bios, meaning life, and mimesis, meaning to imitate. Other terms often used are bionics or bio-inspiration.

The goal is to create products, processes, and policies, new ways of living that are well adapted to life on earth over the long haul. The core idea is that nature has already solved many of the problems we are grappling with. Animals, plants, and microbes are the consummate engineers. After billions of years of research and development, failures are fossils, and what surrounds us is the secret to survival.

62. Learning Objective:

- To understand the principles and usage of biomimicry and explore opportunities in nature.
- To demonstrate the power of biomimicry by designing products by taking inspiration from nature and surroundings.

63. Course Contents:

1. What is biomimicry and how nature inspires humans to create different technology
2. History and scope of biomimicry

3. Bio-inspired technologies
4. Locomotion
5. Construction and architecture
6. Structural materials
7. Self-healing materials
8. Surfaces
9. Adhesion: Wet adhesion and Dry adhesion
10. Optics: Inspiration from fruits, plants and animals
11. Case studies on biomimicry

64. Course Outcomes

CO1: Understand the principle and usage of biomimicry in design
CO2: Demonstrate the use of biomimicry in product design

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	1	1	2	0	2	0	2	0	2	3	0	3	0	1
CO2	1	0	1	1	3	0	1	0	0	3	3	0	1	3	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

65. Prerequisites and Materials

- Students should be aware of nature and its surrounding
- Design Research Methodology

Reference Books:-

1. Biomimicry: Innovation Inspired by Nature by Janine M. Benyus
2. Biomimicry in Architecture by Michael Pawlyn
3. Braiding Sweetgrass: Indigenous Wisdom, Scientific Knowledge and the Teachings of Plants by Robin Wall Kimmerer
4. Gathering Moss: A Natural and Cultural History of Mosses by Robin Wall Kimmerer
5. The Hidden Half of Nature by Anne Biklé and David R. Montgomery
6. I Contain Multitudes: The Microbes Within Us and a Grander View of Life by Ed Yong
7. Adapt: How Humans Are Tapping into Nature's Secrets to Design and Build a Better Future by Amina Khan
8. Evolution by Stephen Baxter (Sci-Fi)
9. Storms of my Grandchildren by James Hansen
10. Birthright: People and Nature in the Modern World by Stephen Kellert
11. Science of Seeing: Essays on Nature from Zygote Quarterly by Adelheid Fischer

Web Link:-

1. https://biomimicry.org/
2. https://biomimicry.org/what-is-biomimicry/
3. https://biomimicry.net/
4. https://biomimicry.net/what-is-biomimicry/
5. https://www.ted.com/topics/biomimicry
6. https://www.digitaltrends.com/cool-tech/biomimicry-examples/

Online Videos:

1. https://www.youtube.com/watch?v=r1CpzEGhs3c
2. https://www.youtube.com/watch?v=sf4oW8OtaPY
3. https://www.youtube.com/watch?v=k_GFq12w5WU
4. https://www.youtube.com/watch?v=wdoriWPaaDI
5. https://www.youtube.com/watch?v=2d1VrCvdzbY
6. https://www.youtube.com/watch?v=SFT6VmxgFzg
7. https://www.youtube.com/watch?v=FynuR_g-ewo

The Wearables

Course Code: SDID 3015P
Credit: 3
L-T-P: 2-0-2

66. Course Brief:

Technology has always affected the practice of product design. Though design and technology have long intersected, recent developments in computation have enabled the adoption of new methods, tools, and approaches to design. From materials to new manufacturing processes of the industrial age, advancements in technology have driven forward our understanding of the aesthetics, style, and functionality of product and accessories. Design and Technology provides a conceptual framework for how new technologies are used in product design and shows how they can be implemented into the design process. Due to intervention of advance electronics, the minimalistic approach have been achieved in product design. Many of the products, which were used as standalone has become wearable accessories; for example communication devices. Different materials, production routes, performance characteristics, application areas and functionalization mechanisms are covered to achieve wearable devices across disciplines like fashion, health care, communication, textile, personal safety.

In this course, the students have to select a particular sector and work on wearable devices for user needs, which may or may not be limited to human beings.

67. Learning Objective:

To understand the need and scope of wearable devices in product design as well as the technology associated with it

To generate new concepts of wearables which may or may not be limited to human beings

68. Course Contents:

1. Need and scope of wearable devices in our lifestyle
2. Sectors adopting wearable technology- lifestyle products, healthcare, personal safety, pet movements, child & woman safety, communicatation etc
3. User experience and Interface for wearable devices
4. Ergonomics involved in design of wearable
5. Materials used or can be used in wearable devices
6. Wearable Technology
7. Security: Device Security, Link Security and Cloud Security
8. User need and aspiration towards wearable functions
9. Case studies on wearable devices

69. Course Outcomes

CO1: Understanding scope of wearable device in product design and learn few of the case studies to enrich knowledge on minimalistic technology

CO2: Generating feasible concepts of wearable devices considering user need and advance technology in product design

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	2	1	2	0	1	0	0	0	2	3	0	3	0	0
CO2	2	0	2	2	2	2	1	3	1	3	2	0	1	3	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

70. Prerequisites and Materials

Understanding of Simple product Design / Lifestyle Product Design
Understanding of ergonomics and anthropometry

Reference Books:-

1. Designing for Wearables: Effective UX for Current and Future Devices by Scott Sullivan
2. Wearable Electronics by Marty Gitlin
3. Wearable Technology by Valerie Bodden
4. Wearable Electronics and Photonics by Xiaoming Tao
5. Smart Clothes and Wearable Technology by J McCann, D Bryson
6. Wearable Technology: Smart Watches to Google Glass for Libraries by Tom Bruno, Ellyssa Kroski
7. Smart Textiles: Wearable Nanotechnology by Nazire D Yilmaz
8. Fashion and Technology: A Guide to Materials and Applications by Aneta Genova, Katherine Moriwaki

Web Links:

1. https://www.dezeen.com/tag/wearable-technology/
2. https://www.awwwards.com/now-is-the-time-to-design-for-wearables.html
3. https://www.pinterest.com/artefactgroup/design-wearables/https://www.wired.com/2015/08/5-principles-designing-wearables/
4. https://theblog.adobe.com/designing-for-wearables-11-things-to-keep-in-mind/
5. https://www.paulolyslager.com/5-tips-design-better-wearable-technologies/

Online Videos:

1. https://www.youtube.com/watch?v=thCNop6Pi9Q
2. https://www.youtube.com/watch?v=WMz5CMeXOLY
3. https://www.youtube.com/watch?v=noiKR_yWniU
4. https://www.youtube.com/watch?v=g84Xs34xntg
5. https://www.youtube.com/watch?v=u8tnYt30L-A
6. https://www.youtube.com/watch?v=WG0AJH_Bb0w
7. https://www.youtube.com/watch?v=FESv2CgyJag
8. https://www.youtube.com/watch?v=qnkGRqT37vc

Craft Design

Course Code: SDID 3016P
Credit: 3
L-T-P: 2-0-2

71. Course Brief:

Design has its root in crafts. Essential Products were designed and created by craftsmen. Introduction to Crafts remain an essential part of Design education. The students will be exposed to the vivid crafts accessible in the vicinity of the town. The students will then study a craft with an instructor and work with local artisans to build products in line with the tradition and skills of the craftsmen. Emphasis will be on product improvement and diversification.

72. Learning Objective:

Students will learn about craft and its cluster. They will understand the importance of craft, craft base product, skills, process and raw materials involve. It will also give them hands on experience to enhance their skill and knowledge to implement their ideas.

73. Course Contents:

- Studying a craft, craftsmen, culture and its importance
- Observing techniques, tools and processes used by the craftsmen
- Developing hands-on skill and handling of the material
- Studying the existing products and identifying opportunities for product diversification
- Creation of new products

74. Course Outcomes

CO1: Demonstrate craft skill, culture & enrichment and usage of proper craft tools & documents design develop craft product on selected domain

CO2: Demonstrate hand skill in handling material by design and develop craft product on selected domain

CO3: Create new product, photograph & document

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1	0	0	0	1	2	1	0	3	1	1	0	0
CO2	1	0	0	0	0	0	1	2	1	3	3	1	0	0	1
CO3	0	0	0	0	0	0	2	2	1	3	3	1	0	0	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

75. Prerequisites and Materials

4. Sketch book, Drawing materials
5. Laptop and camera

Reference Books:

1. Handmade in India by Aditi Ranjan
2. The Industrial Design Reader by Carma Gorman, Allworth Press
3. History of Art by H. W. Janson, H. N. Abrams
4. History of Modern Design by David Raizman, Pearson Prentice Hal

Web Links:

1. http://www.walkthroughindia.com/offbeat/35-unique-handicrafts-geographical-indications-india/
2. http://www.indianmirror.com/crafts/crafts.html
3. http://www.handicrafts.nic.in/ThemeCrafts/ThemeCrafts.aspx
4. http://www.india-crafts.com/
5. https://www.culturalindia.net/indian-crafts/

Online Video:

1. https://www.youtube.com/watch?v=Noac7NcU3Dc
2. https://www.youtube.com/watch?v=30ZP1uxCCWE
3. https://www.youtube.com/watch?v=5QxONL67Bgs
4. https://www.youtube.com/watch?v=N_4zZHBB3aE
5. https://www.youtube.com/watch?v=NNsq3JG68jQ
6. https://www.youtube.com/watch?v=GsMS3DUfdvg
7. https://www.youtube.com/watch?v=ZByuy9D8us8

Packaging Design

Course Code: SDID 3017P
Credit: 3
L-T-P: 2-0-2

1. **Course Brief**

Packaging is the science, art and technology of enclosing or protecting products for distribution, storage, sale, and use. Packaging also refers to the process of designing, evaluating, and producing packages. Packaging can be described as a coordinated system of preparing goods for transport, warehousing, logistics, sale, and end use. Packaging contains, protects, preserves, transports, informs, and sells. In many countries it is fully integrated into government, business, institutional, industrial, and personal use.

In this course the student have to select a product and design the aesthetic as well as structural packaging for the same.

2. **Learning outcome**
   - To design a package that is appealing to the customer and maintains manufacturing specifications
   - To use design applications to create full color renditions of specific packaging dimensions.

3. **Course Content:**
   - Branding graphics for Packaging
   - Packaging materials: Different materials used for packaging
   - Material Properties used for packaging a product / goods.
   - Flexible and Rigid Packaging
   - Industrial Packaging and Consumer Goods Packaging
   - IS 1060 standards for packaging
   - Structural and aesthetic packaging
   - Costing involved in packaging design
   - IS 1060 standards for packaging
   - Supply chain for packaging design

4. **Course Outcomes**

CO1: Understand the definition and need of product packaging
CO2: To explore different material used in different type of product packaging and understand the material properties exploited in that particular packaging solution
CO3: Demonstrate packaging solutions for a particular product considering the structural and aesthetic requirements

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	0	0	2	0	1	0	1	2	2	3	0	2	0	0
CO2	0	0	0	0	0	2	0	1	1	1	3	0	3	0	0
CO3	1	1	1	0	0	0	0	1	1	3	1	0	0	2	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. **Prerequisites and Materials**
   - Material and Manufacturing Processes
   - Visual Communication

Reference Books:-

1. Package Design Workbook: The Art and Science of Successful Packaging, by Steven DuPuis, JOhn Silva
2. For Sale: Over 200 Innovative Solutions in Packaging Design By John Foster
3. Paper Folding Templates for Print Design, Formats, Techniques and Design Considerations for Innovative Paper Folding, By Trish Witkowski
4. Best Practices for Graphic Designers: Packaging, By Grip
5. Green Your Work: Boost Your Bottom Line While Reducing Your Carbon Footprint, By Kim Carlson
6. Amazing Package Design, By the Editors of Print Magazine
7. The Package Design Book 2 by Pentawards
8. Packaging Essentials: 100 Design Principles for Creating Packages (Design Essentials) by Sarah Roncarelli
9. Structural Packaging: Design Your Own Boxes and 3D Forms by Paul Jackson
10. 1000 Package Designs: A Comprehensive Guide to Packing it In by Grid
11. Box Bottle Bag: The World's Best Package Designs from TheDieline.com by Andrew Gibbs

12. Advanced Packaging (Structural Package Design) by Pepsin Press
13. Exploring Package Design (Design Exploration) by Chuck Groth
14. Packaging Design: Successful Product Branding From Concept to Shelf by Marianne R. Klimchuk and Sandra A. Krasovec
15. Really Good Packaging Explained: Top Design Professionals Critique 300 Package Designs and Explain What Makes Them Work by Rob Wallace, Bronwen Edwards, Marianne Klimchuk and Sharon Werner

Web Links:

1. https://www.fiverr.com/categories/graphics-design/product-packaging-design
2. https://www.canva.com/learn/packaging-design/
3. https://www.designerpeople.com/packaging-design-company.html?source=google&medium=adwords&campaign=PackagingDesignCampaign&adgroup={adgroup}&keyword=packaging%20design&matchtype=e&device=c&gclid=Cj0KCQiAk-7jBRD9ARIsAEy8mh4XXC_DDMLz-yBqWK96V8K6FhsO70Aw685CHOfg0rNLTA152muOJR8aAsLmEALw_wcB
4. https://99designs.com/product-packaging-design
5. https://99designs.com/designer-resource-center/designing-product-packaging

Online Videos:

1. https://www.youtube.com/watch?v=9TlaatQ8YFg
2. https://www.youtube.com/watch?v=y-71oLC-CSE
3. https://www.youtube.com/watch?v=SrHiBOwrDBQ
4. https://www.youtube.com/watch?v=5qpW4nOiK9Y
5. https://www.youtube.com/watch?v=rtDYsIBTY5A
6. https://www.youtube.com/watch?v=XyrhbB8WNWM
7. https://www.youtube.com/watch?v=gUqkD4qIWY0
8. https://www.youtube.com/watch?v=Dtm8eajzRd4
9. https://www.youtube.com/watch?v=wNv2_f3F-Os
10. https://www.youtube.com/watch?v=a-zDUbaUCtc
11. https://www.youtube.com/watch?v=4hP2TYYhLSM

Photography & Videography

Course Code: SDID 3024P
Credit: 3
L-T-P: 2-0-2

6. Course Brief

Photography plays a critical role throughout the design process. It is very important during research. From the preliminary framing of a design challenge through to the communication of research findings and design direction. Documentary photography, how images have been used to communicate. Understanding how to analyze images from field research, effectively utilizing them as a key source of data, yields powerful insights that bring observational research to its full potential.

7. Learning outcome

- Students will learn how to take successful photographs for the end-to-end design process.
- Objectives focus on the role of photography in several types of research: ethnographic research, user-generated media and immersion studies. Students will learn to both compose and to use imagery to understand and communicate issues surrounding typical design challenges.

8. Course Content:

- Understanding camera, accessories and other equipment.
- Compositions / frames
- Photography for ethnographic research
- Photography for Visual documentation
- Techniques of handling video camera
- Video production Process: Pre-post
- Art: Different kind of shots, framing, exposure
- Science of videography: centre of focus, focal length, size of video

9. Course Outcomes

CO1: Using photography as a tool in several research methods

CO2: Analyzing images to inform a deeper understanding of user behaviors, interactions with objects and environments, interpretation of artifacts and cultural media
CO3: Leveraging images as an illustrative element in communicating ideas and concepts

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	3	1	1	0	0	1	2	1	0	3	1	3	0	0
CO2	1	3	0	3	0	2	0	2	0	0	3	0	2	1	0
CO3	2	0	3	1	0	0	2	1	1	0	2	1	0	1	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

10. Prerequisites and Materials

- Camera
- Visual Communication

Reference Books:-

1. The Digital Photography Book by Scott Kelby.
2. The Art of Photography: An Approach to Personal Expression by Bruce Barnbaum.
3. Photography by Barbara London, John Upton and Jim Stone, Pearson.
4. The Art of Photography: An Approach to Personal Expression by Bruce Barnbaum, Rocky Nook.
5. Complete Digital Photography by Ben Long, Cengage Learning.
6. Photography: A Cultural History by Mary Warner Marien, Pearson.
7. Digital SLR Settings and Shortcuts for Dummies by Doug Sahlin.

Web Link:

1. https://www.tandfonline.com/doi/abs/10.1080/08949468.1991.9966560?journalCode=gvan20

2. http://www.oxfordhandbooks.com/view/10.1093/oxfordhb/9780199811755.001.0001/oxfordhb-9780199811755-e-031
3. https://core.ac.uk/download/pdf/51087673.pdf
4. https://www.emeraldinsight.com/doi/abs/10.1108/13522751111137488
5. https://www.researchgate.net/publication/318428908_Use_of_photography_as_a_research_method_in_sociology
6. http://www.qualitative-research.net/index.php/fqs/article/view/856/1860
7. https://www.jove.com/blog/news/10-tips-for-making-a-great-research-video/
8. http://www.mayaproject.org/blog/2015/11/15/how-to-turn-your-research-findings-into-a-video-that-people-want-to-watch
9. http://blog.impactstory.org/impact-challenge-video-abstract/

Online Videos:

1. https://www.youtube.com/watch?v=wp-kPjOMS4k
2. https://www.youtube.com/watch?v=EEaupANWMfY
3. https://www.youtube.com/watch?v=KhvDrpcqkJE
4. https://www.youtube.com/watch?v=zy31Y6Qo8s4
5. https://www.youtube.com/watch?v=7ZVyNjKSr0M
6. https://www.youtube.com/watch?v=xHvFHRPLvII&t=354s
7. https://www.youtube.com/watch?v=JaH8tLD17pY
8. https://www.youtube.com/watch?v=1WUW-OgBTe0
9. https://www.youtube.com/watch?v=BIoXqTSBisQ

Semester 6

Year 3

Joining and Fastening Devices

Course Code: SDID 3001
Credit: 2
L-T-P: 1-0-2

76. Course Brief:

Designing the details of the product is the most challenging part of the design process. One of the most essential technical and functional aspect of the component of any product is as to how they will mate together to fulfil functional requirements. A designer has to take care of both functional as well as aesthetic requirements while designing joineries. A designer must have knowledge of standard industrial fasteners and emerging developments. Also, at times some creative explorations might be essential to design innovative joineries essential for a specific project.

77. **Learning Objective**

- To understand the different type of material and how to join them together
- To identify and use suitable joineries in product design

78. Course Contents

1. Importance of Joineries
2. Wood Working Joineries
3. Metal Joineries (screws, nuts-bolts and threads)
4. Plastic fits and joineries
5. Joining different metals/non-metals
6. Creative design of joineries

79. Course Outcomes

CO1: Demonstrate importance of joineries, wood working, metal and plastic joineries.
CO2: Demonstrate creative joineries by doing a project

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	0	3	2	0	1	0	1	0	2	3	0	1	3	3
CO2	2	0	3	2	0	1	0	1	0	2	3	1	1	3	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

80. Prerequisites and Materials

- NA –

References Books:

1. Manufacturing Processes for Design Professionals by Rob Thompson
2. Manufacturing Processes for Advanced Composites
3. Materials and Process Selection for Engineering Design, Second Edition by Mahmoud M. Farag
4. Industrial Design: Materials and Manufacturing by Jim Lesko
5. Advances In Material Science by R.K.Dogra
6. Ceramic Materials: Science and Engineering by C. Barry Carter and M. Grant Norton
7. Surface Coatings by Mario Rizzo and Giuseppe Bruno

Web Links:

1. https://techcenter.lanxess.com/scp/americas/en/docguard/Joining_Guide.pdf?docId=77016
2. https://www.globalspec.com/reference/69818/203279/chapter-14-fastening-and-joining-techniques-and-hardware
3. http://faculty.up.edu/lulay/ME341/HW8-F10.pdf
4. https://www.sciencedirect.com/topics/materials-science/mechanical-fastening
5. https://www.thesprucecrafts.com/wood-joinery-methods-use-no-fasteners-3536634
6. https://www.thesprucecrafts.com/wood-joinery-types-3536631
7. https://www.albanycountyfasteners.com/Fastener-Varieties-s/1130.htm
8. https://www.hunker.com/12303763/types-of-construction-beams-their-uses

Online Videos:

1. https://www.youtube.com/watch?v=zqXLYe783qw
2. https://www.youtube.com/watch?v=mHBanmfn_CA&list=PL9AX_8MObdPdDQTaPuH5tTaKOPwKU6O6Q
3. https://www.youtube.com/watch?v=TOq3Bgln_K0
4. https://www.youtube.com/watch?v=7a6X-_q2vo0
5. https://www.youtube.com/watch?v=cFdmnvlP-PI
6. https://www.youtube.com/watch?v=1uJfGIyrdbs
7. https://www.youtube.com/watch?v=R3w2XWOwYS8

Project 4: Technically Complex Product

Course Code: SDPJ 3132
Credit: 5
L-T-P: 2-0-6

1. Course Brief

This project is assimilation of skills and aptitude acquired during the past semesters. It is a full-fledged project, which requires an in-depth investigation of a relatively complex product, which has a certain amount of mechanical, electrical/electronic complexity. The entire process of locating a product, analyzing it, and offering a solution is to be followed. Moreover, packaging solution is also to be suggested. This project is a "technically complex industrial product design" exercise. The students could be given a generic topic to work upon or each student/group can select the project/product for design or redesign.

The aim here is to teach the students the basic process followed in design of an industrial product. It also takes them through the problem solving stages and approach to creativity and innovation. The project will have steps of Design Brief, surveys (literature, market and user), problem Definition, Concepts, Renders and finalisation, Concept evaluation, Engineering aspects, try out and final model and final design proposals.

The deliverables of this project could be report, final model/mock-up and presentation.

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2. **Learning Objective**
   - To make the student aware of the technically complex products and its requirements in users' life
   - To understand the mechanical and electrical / electronic complexities inside the product
   - To demonstrate superior design solutions for complex problems.

3. **Course Contents**

   1. **Project Work:** Starting from a given product, concept in the form of preliminary sketch to a model or working prototype of a product, would be made while taking it through the process of form development.
   2. **Product Configuration**: Product brief, basic drawings & safety constraints, mood board creation, persona creation.
   3. **Concept Generation**: Concept sketches, evaluation & selection of concept, 2D rendering using markers and Adobe Photoshop, finalising concept and sketches.
   4. **Dimensioning & Preliminary Drawings**: 2D drawing generation, sectional views, wire diagrams, package drawing creation, ID control drawings.
   5. **Advance Design Tools**: PDS, QFD, DFMA, VE, Benchmarking
   6. **Physical Modelling:** Checking with physical models using plaster of paris (POP)/clay/thermocol for understanding the form and refining, full size rigs, tape drawings & iterations, template creation.
   7. **3D Modelling:** Creation of final 3D model in Autodesk Alias/Rhino, checking surfaces qualities, rendering of 3D model.
   8. **Prototype of the Final Model:** Introduction to RPT Machine, basic training, creating final model in clay/wood/plastic etc.

4. **Course Outcomes**

   CO1: To implement the design process to execute design of a technologically complex product
   CO2: To be able to do primary and secondary research and collect data for product, market and user need analysis and generate many concepts
   CO3: To be able to make 3D models of the selected concepts for final detailing and validate the design solutions through scaled appearance models or prototypes

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	3	1	3	0	3	1	3	0	0	3	1	3	0	0
CO2	2	3	2	2	3	3	2	2	2	3	3	1	1	2	1
CO3	1	1	2	2	2	1	0	0	1	2	1	0	0	1	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. **Prerequisites and Material**
   6. Basic understanding of design Process & research methods and techniques
   7. Project 1: Simple Product Design
   8. Laptop and Camera

Reference Books

1. Design and Technology by James Garratt, Cambridge University Press
2. Design and Technology by Colin Caborn & John Cave, Thomas Nelson Publishers
3. Design Research: Methods and Perspectives by Brenda Laurel and Peter Lunenfeld
4. Product Design and Development, by by Karl Ulrich, Steven Eppinger
5. Mechanical Details for Product Design Hardcover, by D C Greenwood

Web Links:

1. https://www.designideas.pics/cookout-technically-complex-product/
2. https://mediatum.ub.tum.de/doc/622288/file.pdf
3. https://www.sciencedirect.com/science/article/pii/S0142694X16300631

Online Videos:

1. https://www.youtube.com/watch?v=dpNGfYpabYg
2. https://www.youtube.com/watch?v=uTigReRAonE

3. https://www.youtube.com/watch?v=3iRuYaPTReo
4. https://www.youtube.com/watch?v=ICCUGOlnuGo
5. https://www.youtube.com/watch?v=mMEs4Fdrjkc

Industrial Visit **INDT 3101** **L: T: P: C** :: 1:0:0::1

1. Course Description

Academics has to play a role hand to hand with Industry. Industry orientation and recognition of actual scenario is equally important. Students are taken to few relevant industries for a trip to quickly have an experience of industry scenarios.

2. Learning Objective

- To have experience and feel of relevant industry

3. Course Contents

- Visit to product and transportation design firms
- Visit to manufacturing industries

4. Course Outcomes

CO1: Student get a feel of industry.

CO2: Students will be able to relate academics with industry.

CO3: Students are able to identify their strength and match with industry requirements.

CO4: Students can get a broader picture of concept to product application.

5. Prerequisites and Materials

- Students should have basic understanding of design and prototyping

Table: Correlation of POs & PSOs v/s COs

PO & PSO Vs CO	Develop Creative Mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Team Work	Professional Ethics	Sustainable Solutions	Local & Global Context	Lifelong Learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1	1	1	1	3	3	3	1	1	2	2	1	1
CO2	1	1	1	2	1	2	3	2	1	1	1	1	1	2	1
CO3	0	2	1	2	2	2	1	1	1	1	1	1	1	1	1
CO4	0	2	1	2	2	1	1	2	1	1	1	1	1	1	1

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Digital Interface and Experience Design

Course Code: SDID 3020P
Credit: 4
L-T-P: 1-0-6

1. **Course Brief:**

   User experience design (UX Design) is the process of enhancing user satisfaction by improving the usability, accessibility, and engagement provided in the interaction between the user and the product **User interface design (UI)** is the design of user interfaces, with the focus on maximizing the user experience and making it as visually appealing as possible. The goal of user interface design is to make the user's interaction as simple and efficient as possible, in terms of accomplishing user goals (user-centered design).

2. **Learning Objective:**
   In this course students will learn the fundamentals of UI/UX design and about its applications.

3. **Course Content:**

   Theoretical/ tutorial
   - User Requirement Analysis Methods: contextual enquiry, task analysis, user survey
   - Information Architecture, Interaction and Navigation design
   - Wire framing and creation of mockups
   - UI design: Look and feel of the application and usability aspects

   Practical
   The students would initially discuss different types of user interfaces including mobile apps, websites, products, ATMs etc. After this initial orientation, the students would go through a short project in which they create their own application with a user experience. Special focus would be given to the design of the interface and look and feel of the application to ensure that it is user friendly and visually appealing for the audience.

4. **Course Outcomes:**
   CO1: Learn the fundamentals of UI/UX design
   CO2: Practically apply principles of UI/UX
   CO3: Ability to design an interface
   CO4: Ability to document the UX Process

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	CO1	0	3	0	2	0	1	0	0	0	0	3	0	0	0
CO2	CO2	1	0	2	0	2	3	0	3	0	0	3	1	0	2
CO3	CO3	2	1	3	1	1	2	0	0	0	1	3	1	0	2
CO4	CO4	0	0	1	0	0	0	0	1	3	0	3	1	0	0

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High**:**

5. Prerequisites and Materials

Student must have understood the product design process.
Student must have proficient command over Photoshop software.

Reference Books:

1. Usability Engineering by Jakob Nielsen
2. The Elements of User Experience: User-Centred Design for the Web and Beyond by Jesse James Garrett, New Riders
3. The Usability Engineering Lifecycle: A Practitioner's Handbook for User Interface Design by Deborah J. Mayhew, Morgan Kaufmann
4. Invisible Computer: Why Good Products Can Fail, the Personal Computer Is so Complex and Information Appliances Are the Solution by Donald A Norman, MITPress

5. The Humane Interface: New Directions for Designing Interactive Systems by JefRaskin, Pearson Education
6. Morville, Peter; Information Architecture for the World Wide Web: Designing Large-Scale Web Sites by Louis Rosefeld, O'Reilly & Associates
7. Envisioning Information by Edward Tufte, Graphics Press

Web Links:

1. https://www.uxpin.com/studio/ui-design/what-is-a-wireframe-designing-your-ux-backbone/
2. https://www.interaction-design.org/literature/topics/wireframing
3. https://www.invisionapp.com/inside-design/how-to-wireframe/
4. https://uxplanet.org/moving-from-static-design-to-interactive-design-in-just-a-few-clicks-e1ddfe65513f
5. https://uxplanet.org/5-free-quick-wireframe-tools-for-ui-ux-designers-in-2017-189e6a594fda
6. https://www.interaction-design.org/literature/article/10-free-to-use-wireframing-tools

Online Video:

1. https://www.youtube.com/watch?v=i4Zg6_yKOh8
2. https://www.youtube.com/watch?v=PmmQjLqJQlY
3. https://www.youtube.com/watch?v=e2Oynq-mOLk
4. https://www.youtube.com/watch?v=KdfO_e0yK-g
5. https://www.youtube.com/watch?v=0RxxQrJCmV4
6. https://www.youtube.com/watch?v=I0-vBdh4sZ8
7. https://www.youtube.com/watch?v=_Hp_dI0DzY4

Digital Marketing

Course Code: SDID 3021P
Credit: 4
L-T-P: 1-0-6

81. Course Brief:

In this course students will be exposed to several aspects of the new digital marketing environment, including topics such as digital marketing analytics, search engine optimization, social media marketing. Students will have a richer understanding of the foundations of the new digital marketing landscape and acquire a new set of stories, concepts, and tools to help them digitally create, distribute, promote and price products and services.

82. Learning Objective:

- Students will learn how digital tools, such as the Internet, smartphones, and 3D printing, are changing the scenario of marketing by shifting power from manufacturers to the end consumers.
- Students will learn theory and strategy behind marketing analytics

83. Course Contents:

Q. Theoretical

- Successful case studies & Insights about best Digital Marketing campaigns which involve Branding, Awareness, Revenue & Lead generation.
- Shift of marketing from traditional to digital and the future of it.
- Different tools required for the digital marketing at various platforms.

R. Practical/Tutorial

A student will have to take up a hypothetical or a real small firm and develop a complete online marketing strategy on various verticals.

84. Course Outcomes

CO1: Students will gain knowledge about the changing scenario of the marketing from traditional to digital platform.
CO2: Students will learn to analyze the complex demographic data and make strategy to drive users.

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	2	1	3	0	0	0	1	1	0	3	0	3	1	0
CO2	2	3	2	3	1	2	0	2	2	0	3	0	1	3	2

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

85. Prerequisites and Materials

- Students need not to have any pre requisite for this subject.

Reference Books:-

38. Digital Marketing for Dummies, By Ryan Deiss and Russ Hennesberry, 2017
39. Google Adwords for Beginners: By Cory Rabazinsky, 2015
40. Influence: The Psychology of Persuasion (Robert Cialdini)

Web Links:-

27. https://blog.marketo.com/2019/01/how-your-website-can-be-your-biggest-digital-strategy-opportunity.html
28. https://blog.marketo.com/2018/10/why-organic-marketing-is-here-to-stay-and-how-to-add-it-to-your-strategy.html
29. https://blog.marketo.com/2018/11/building-a-business-around-your-website-going-live-measuring-success.html
30. https://blog.marketo.com/2018/10/how-to-turn-your-website-wishes-into-an-actionable-plan.html
31. https://digitalagencynetwork.com/how-to-design-an-ecommerce-marketing-plan-for-2019/

Online Videos:

1. https://www.youtube.com/watch?v=b-gwbVJqi9Y
2. https://www.youtube.com/watch?v=HAYYzA8lIKo
3. https://www.youtube.com/watch?v=Cto5R8p74kg
4. https://www.youtube.com/watch?v=cA7dOKsd--I

Tangible Interface Design

Course Code: SDID 3022P
Credit: 4
L-T-P: 1-0-6

11. Course Brief

Products cannot be operated efficiently without a proper interface. The designer must also make sure that his or her design bonds with the user without any discomfort. In Tangible Interface Design, the student will realize the importance of various factors like eye level, human product interaction, posture of operation etc. while designing a product. This subject induces an understanding of ergonomically efficient design in the student. The students will be gaining exposure to deduce human reaction and effort required while interacting with a product and recording feedback.

Interface design is about creating a comfortable and efficient way of communication between a machine and its human user. With on-going developments in information technology for last couple of decades, the interface design has improved many folds. We are surrounded my machines and most importantly dependent upon their interface to operate them.

12. Learning outcome

- To educate student on the day to day interfaces and the technical complexities behind them
- To enable students to make desired interfaces considering human mental model and ergonomics.

13. Course Content:

- **THE CONCEPT OF INTERFACE:** Terminology, information systems and interface design, cognitive ergonomics, use of media information elements and interaction styles in interface design, efficient operation, cognitive systems, control-panel design, types of controls, information display.
- **PSYCHOLOGICAL FACTORS AFFECTING HUMAN DECISION MAKING:** Cognition, perception, sensation, instructional message design, user capabilities and limitations.
- **ASPECTS OF INTERFACE DESIGN:** Grips, visual ergonomics, controls, influence of environment, optimization.
- **DESIGN FOR ELDERLY AND DIFFERENTLY ABLED:** User specific questionnaires and surveys, interviewing and participant observation, analysis of qualitative data, regulations for accommodating differently abled and elderly users, ethnographic data collection & analysis.
- **PROJECT WORK ON USER INTERFACE DESIGN:** Interfaces for hand-held products, table top products, electronic & interactive products

14. Course Outcomes

CO1: To understand the concept of interface, information system and cognitive ergonomics
CO2: To execute an interface design projects for handheld products or table top products or electronics and interactive products

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	2	1	2	0	0	0	3	1	0	3	1	3	0	0
CO2	1	0	1	1	1	3	0	1	1	3	2	0	0	3	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

15. Prerequisites and Materials

Design Process
Applied Ergonomics / Advanced Ergonomics
Visual Communication

Reference Books:-

1. L. Spillmann, and J. S. Werner: Visual perception: The neurophysiological foundations; Academic Press, 1990
2. M. S, Sanders and Ernest J. McCormick: Human Factors in engineering and design, sixth edition, McGraw-Hill International Editions, 1987
3. W.E. Woodson, Human Factors Design Handbook, McGraw Hill, New York, 1981
4. Williams, P.L: Gray's Anatomy, 37th edition, ELBS/Churchill Livingstone, 1992
5. E. Steinfeld, G.S. Danford: Enabling environments: Measuring the impact of environment of disability and rehabilitation, Kluwer Academic/plenum publishers, 1999
6. Usability Engineering by Jacob Nielsen

Web Links:

1. https://www.interaction-design.org/literature/book/the-glossary-of-human-computer-interaction/tangible-interaction
2. https://www.pinterest.com/mitchell5238/tangible-user-interface/
3. https://www.uio.no/studier/emner/matnat/ifi/INF5722/h14/lectures/toni_tangible_16september2014_notes.pdf
4. https://journal.acs.org.au/index.php/ajis/article/view/123
5. https://core.ac.uk/download/pdf/30343743.pdf
6. https://www.slideshare.net/simonemora/tui-15934667
7. https://slideplayer.com/slide/4418344/

Online Videos:

1. https://www.youtube.com/watch?v=uzsnB5eUs_U
2. https://www.youtube.com/watch?v=Q2OJCFDoXNQ
3. https://www.youtube.com/watch?v=7KNqxnv8Fn4
4. https://www.youtube.com/watch?v=DMqJAE_cTGA
5. https://www.youtube.com/watch?v=OY_9OmUaocY
6. https://www.youtube.com/watch?v=wm5WCScGKxs&list=PLiLITt6tAe0ULK-sykKtRM6_w0UtZ11Sx
7. https://www.youtube.com/watch?v=MTmge7-yWOo
8. https://www.youtube.com/watch?v=_Hp_dI0DzY4&t=27s

Furniture Design

Course Code: SDID 3023P
Credit: 3
L-T-P: 1-0-4

86. Course Brief:

Furniture refers to movable objects intended to support various human activities such as seating, eating, sleeping and leisure. Furniture is also used to hold objects at a convenient height for work, or to store things. Furniture can be a product of design and is considered a form of decorative art.

From the earliest cave dwellers, to those enjoying gloriously gilded mansions and castles; however crude or sophisticated; man has needed furniture. Furniture designers have the pleasure of combining what is functional and technically sound, with what will suit an unlimited variety of tastes and usage. With a wide range of wants and needs pervading the market, a designer has the ability to create furniture art in any number of ways, within a wide range of sub-specialties. Furniture design is a specialized field where function and fashion collide. Many interior designers believe that furniture is one of the most important aspects of an interior space. Pieces of furniture not only add function and practicality to a space, but they also add style and personality. Furniture has evolved and changed with the times, and some styles have remained somewhat constant throughout the years, while others have drastically changed or become obsolete. Today, creating new furniture styles is often seen as a type of industrial art form.

87. Learning Objective:

To educate designers to handle all aspects of furniture design as one integrated user centric area of study; and their ability to integrate all such elements and systems into coherent wholes in various interior spatial contexts is considered to be important.

To work with the material and process technology to develop a practical purview which aids enhancement of knowledge and understanding.

To demonstrate the understanding by making furniture prototype

88. Course Contents:

1. History and Scope of Furniture Design
2. Materials involved in furniture design – wood, metal, plastic
3. Getting desirable surface finish
4. Mapping Spaces – Interior and Public Spaces
5. Human lifestyles, activities and Interactions
6. Form Space and Furniture
7. Outdoor space furniture
8. Special purpose furniture
9. Design of stackable /foldable furniture
10. Case studies on furniture design

89. Course Outcomes

CO1: Research on form and space to find out the feasibility of suitable furniture

CO2: Collate material, manufacturing, ergonomic, surface finish and dimensional information to arrive at final specification

CO2: Designing and developing desirable furniture

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	2	0	1	0	0	0	3	0	0	2	1	3	0	0
CO2	1	3	3	3	3	3	3	1	3	3	3	1	3	2	0
CO3	2	1	2	3	1	2	0	1	2	1	1	2	1	2	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

90. Prerequisites and Materials

Sound knowledge on material ad processes
Joining and fastening devices
Knowledge on CMF

Reference Books:-

1. Chairs by OTAKAR MÁČEL, SANDER WOERTMAN, CHARLOTTE VAN WIJK
2. Classical Chinese Furniture by MARCUS FLACKS
3. Design After Modernism: Furniture and Interiors 1970-2010 by JUDITH GURA
4. Donald Judd Furniture: Retrospective by DONALD JUDD
5. Dunbar: Fine Furniture of the 1950s by LESLIE PIÑA
6. Eero Saarinen: Furniture for Everyman by BRIAN LUTZ
7. Furniture Design: An Introduction to Development, Materials and Manufacturing by STUART LAWSON
8. Furniture from British India and Ceylon by AMIN JAFFER
9. Conservation of Furniture by Nick Umney & Shayne Rivers
10. History of Modern Furniture Design by DANIELA KARASOVA
11. Design Secrets: Furniture: 50 Real-Life Projects Uncovered by Laurel Saville

Web Link:-

1. https://www.pinterest.com/behance/furniture-design/
2. https://www.dezeen.com/design/furniture/
3. https://medium.com/@helpmebuild/traditional-indian-furniture-designs-and-techniques-ae325e5a459b
4. https://www.zingyhomes.com/latest-trends/furniture-design-ideas-for-indian-homes/
5. https://www.canadianwoodworking.com/tipstechniques/14-practical-steps-designing-furniture
6. https://www.wikihow.com/Design-Furniture
7. https://www.homestratosphere.com/design-furniture/
8. https://www.godownsize.com/furniture-for-small-spaces/
9. https://resourcefurniture.com/
10. https://www.franceshunt.co.uk/news/2017/08/8-multi-purpose-furniture-thatll-change-your-life/
11. http://www.surgede.lt/en/office-and-special-purpose-furniture/
12. http://www.home-designing.com/2010/12/multi-purpose-space-saving-furniture

Advance Design Tools

Course Code: SDID 4010P
Credit: 3
L-T-P: 1-0-4

16.Course Brief

Industries involved in design of products use a lot of design tools at the internal as well as external level. These tools are there to improve the overall quality of the product and make the corporate working more efficient along with. Value Engineering is a method that is applied to add more value to a product or services being offered by an organisation. Even though it is called Value Engineering, it is very much of creative method that deals with the improvement in the functionality of the product or reducing the cost. However, in the whole process, the value of the product is never reduced.
The students would be introduced to some of these tools that would inculcate in them the peripheral designing aspects of the product.

17.Learning outcome

To understand the tools used in the product design process to reduce cost, process time and enhance aesthetics, usability and practicality
To demonstrate use of design tools in a specific project

18.Course Content:

- Quality Function Deployment (QFD)
- DFA & DFM - DESIGN FOR ASSEMBLY & MANUFACTURING:
- Introduction, applications & implementations, need for DFA/DFM, exercises.
- REVERSE ENGINEERING:
- Introduction, methods, types of machines/software used, legal issues, benefits and applications.
- BENCHMARKING:
- Definition, benefits, applications/uses, process involved, types, tools, costs involved.
- DFMEA-DESIGN FAILURE MODE AND EFFECT ANALYSIS:
- Introduction to Failure Mode and Effect Analysis, implementation of DFMEA, various tools, limitations and benefits.
- VALUE ENGINEERING (VE):

- What is VE, How VE is applied, benefits, defining functions, creative phase, evaluation phase, implementation of new ideas.

19.Course Outcomes

CO1: To understand the design tools like PDS, QFD, DFA, DFM, DFMA and DFMEA etc.

CO2: To understand the value engineering and reverse engineering process, its benefit and legal issues

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	0	2	3	0	1	0	0	1	2	3	1	3	1	2
CO2	0	1	2	3	1	3	0	0	3	2	3	1	3	1	2

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

20. Prerequisites and Materials

- NA-

Reference Books:-

1. Quality Function Deployment - How to Make QFD Work for You, by Lou Cohen, Addison Wesley Publishing co.

2. Quality Function Deployment: Integrating Customer Requirements into Product Design, by YojiAkao, Productivity press.
3. QFD: The Customer-Driven Approach to Quality Planning & Deployment, Shigeru Mizuno, by YojiAkao, Asian Productivity Organization; 1 edition (April 13, 1994)
4. Design for Six Sigma - A Roadmap for Product Development, by Kai Yang, Basem El-Haik, Mc-Graw Hill Publications
5. Design For Six Sigma - Launching New Products and Services Without Failure, Geoff Tennant.
6. Reverse Engineering, by Linda M. Wills, Philip Newcomb.
7. Reverse Engineering, by Kathryn A. Ingle, McGraw Hill Publication
8. Benchmarking- A signpost to excellence in quality and productivity, Wiley, 1993 - Business & Economics
9. The benchmarking book, by Michael Spendolini, AMACOM, American Management Association, 1992 - Business & Economics
10. Benchmarking: A Guide for Your Journey to Best-Practice Processes, by Chris Gardner, Cynthia Raybourn, Lisa Higgins, APQC, 2001 - Business & Economics
11. Techniques of Value Analysis and Engineering, by Lawrence D. Miles, MCGraw-Hill Book Company
12. Practical Value analysis Methods by John H. Fasal, Hayden Book Company
13. Value Engineering Theory by Donald E. Parker, Lawrence D. Miles Value Foundation
14. Value Analysis by Fallon, Carlos, Lawrence D. Miles Value Foundation.
15. Value Analysis by Gage E.L., McGraw-Hill Book Company

Web Links:

1. https://quality-one.com/qfd/
2. http://www.npd-solutions.com/qfd.html
3. https://www.lopol.org/article/value-engineering-and-its-importance-in-engineering-industry
4. https://www.investopedia.com/terms/v/value-engineering.asp
5. https://www.designingbuildings.co.uk/wiki/Design_for_Manufacture_and_Assembly_(DfMA)
6. http://me.gatech.edu/files/capstone/L071ME4182DFA

Semester 7

Year 4

Design Management

Course Code: SDCS 4001
Credit: 2
L-T-P: 2-0-0

91. Course Brief:

Design Management is the topic that plays an important role in the design industry. It manages almost all the peripheral issues related to design. It will help to learn about the connection design has with business success and innovation. It will give the right knowledge around organizational structure, organizational culture and functional leadership of design. Along with that, it ensures that the laws are followed, the rights are protected and the design is kept as close to its idea as possible. Design management de-mystifies much of what entrepreneurs do and, as such, it forms a solid foundation for any enterprise curriculum. The objective of this course is to orient the student on how to become a design entrepreneur.

92. Learning Objective:

- Students will learn about basics of Design Management which will give them the understanding and requirement for a design entrepreneur.
- It provides an overview of topics and issues central to the Strategic Design and Management program, with an emphasis on the relationships between design, experience, social and economic change.

93. Course Contents:

- Marketing Mix
- 4Ps and Porter's Five Forces
- Branding and PESTEL
- Financial and Legal aspects
- Intellectual Property Rites
- Case Study

94. Course Outcomes

CO 1:- Understand the Basics of Management
CO 2:- Apply Brand management criteria at design considerations

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	0	0	1	1	0	2	0	3	0	3	0	3	0	0
CO2	0	1	1	2	2	2	3	3	3	1	3	1	0	0	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

95. Prerequisites and Materials

9. Laptop, or personal computer

Reference Books:-

1. The Tipping Point. 2000, Gladwell, M. Little Brown and Company, London.
2. The 80/20 Principle: the secrets to success by achieving more with less.1998, Koch, R., Doubleday – A Currency Book, New York.
3. Design in Business: Strategic Innovation through Design. 2002, Bruce, M. & Bessant., Prentice Hall, Harlow UK.
4. The Design Agenda: A Guide to Successful Design Management. 1995, Cooper, R. & Press, M, John Wiley & Sons, Chichester UK.
5. Design Management: A Handbook of Issues and Methods. 1990, Oakley, M. - Blackwell, Oxford UK

Web Links:

1. https://www.interaction-design.org/literature/article/design-management-an-introduction-taking-charge-of-processes-and-people
2. https://www.dmi.org/page/what_is_design_manag
3. http://www.dsource.in/course/design-management/what-design-management
4. https://medium.com/thumbtack-design/5-myths-about-design-management-3dcd31f6a6df

Online Videos:

1. https://www.youtube.com/watch?v=HlCCLGCznqs
2. https://www.youtube.com/watch?v=Um9yLWuII0k
3. https://www.youtube.com/watch?v=ILtkAk2A3CY
4. https://www.youtube.com/watch?v=zwAVtYhBygo
5. https://www.youtube.com/watch?v=K0jp484n7c0

Semantics and Semiotics

Course Code: SDID 4012
Credit: 3
L-T-P: 2-0-2

96. Course Brief:

Semiotics is an interpretive science that provides powerful analytical tools for the study of our perception of reality. Semiotics is the academic field dedicated to the study of signs. A sign (for example, the word "ship") may be recognized by the presence of its constituent parts, which in semiotic theories based on Saussure's, at least, are the signifier (the container, or the sign's perceptible form: the letters *s-h-i-p*) and the signified (the meaning or content; the notion conveyed by the signifier: 'a vessel of considerable size for deep water navigation'). With these concepts, general semiotics allows us to describe any system of signs: texts, images, performances, multimedia productions, traffic signals, fashion, daily life, etc. There are specific semiotic systems (for text, images, multimedia, and so on) that take into account the specifics of each system of signs. This chapter is an overview of general semiotics. In the first section, we define the field of semiotics and the concept of the sign, and enumerate the basic concepts and the names of some of the better-known theorists.

97. Learning Objective:

Students apply testing to create designed outcomes and explore means to communicate ideas through application of product semantics, distinguishing between self-perception and how others read design artefacts.

98. Course Contents:

- Basic theory of semiotics.
- What is Sign, Signifier and signified?
- Distinguishing between self-perception and how others read design.
- Product Semantics.

99.Course Outcomes

CO1: The course will help students understand how humans perceive signs and its implications in daily life.

CO2: The course will help students apply the knowledge of general semiotics in tackling design problems on different domains.

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	3	2	1	0	0	0	0	0	0	3	0	2	0	0
CO2	2	3	3	2	0	1	0	1	0	2	3	0	0	3	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

100. Prerequisites and Materials

10. Basic understanding of Design research and Visual Communication
11. Laptop, or personal computer

Reference Books:-

1. SEMIOTICS by Gottdiener, Mark ed.Publication - Lodnon : Sage Publications, 2003

2. Encyclopedia of Semiotics by Bouissac, Paul, Publication - New Delhi 110001 : Oxford University Press, 2000
3. Semiotics!!! (Colloquium) by Mathur, Suchi , Publication - Ahmedabad 2000
4. Theory of semiotics by Umberto Eco.Publication - Bloomington ; London : Indiana University Press, 1976
5. VISIBLE SIGNS: AN INTRODUCTION TO SEMIOTICS by Crow, David, Publication - UK : Academia, 2003
6. Notes on the subject of semiotics by Guha Thakurta, Rukminee, Publication - Ahmedabad 2000
7. Introducing social semiotics by Leeuwen, Theo Van, Publication - London: Routledge/Taylor & Francis Group 2005
8. The Pursuit of signs. Semiotics, Literature, Deconstruction by Culler, Jonathan, Publication - London. : Routledge/Taylor & Francis Group, 1980

Web Links:

1. https://www.choidesign.com/blog/2017/6/2/design-semantics
2. https://repository.upenn.edu/cgi/viewcontent.cgi?article=1262&context=asc_papers
3. https://www.ntnu.edu/documents/139799/1279149990/28+Artikkel+Henrik+Sunde.pdf/f9667e2e-7e9d-49e2-b1bd-a962ed35d7a8
4. http://kisd.de/~jg/z/ps_english.pdf
5. https://www.researchgate.net/publication/32206258_Product_Semantics_-_Exploring_the_Symbolic_Qualities_of_Form

Online Videos:

1. https://www.youtube.com/watch?v=rmiHeWblC9o
2. https://www.youtube.com/watch?v=9ZDkp8dUWyw
3. https://www.youtube.com/watch?v=bcOQQbncnsY
4. https://www.youtube.com/watch?v=p3XvJDxjIpU
5. https://www.youtube.com/watch?v=VsMfaIOsT3M&list=PLyq8Dd4Su3lJOhnzfhs61njL83pryzsQb
6. https://www.youtube.com/watch?v=SjogaQLkfVw
7. https://www.youtube.com/watch?v=R7VA95JdbMQ
8. https://www.youtube.com/watch?v=4VfBmqUyZj8
9. https://www.youtube.com/watch?v=rVP-TWE-Ikg

Seminar: Design for Future

Course Code: SDID 4009
Credit: 1
L-T-P: 1-0-0

1. **Course Brief**

The world is changing faster than ever–socially, technologically, environmentally, politically, and economically. In the midst of these shifts, designers have the crucial task of thinking about what our future will look like and how we will interact with it. Designers working in technology, branding, experience design, architecture, urbanism, product design, and industrial design predicts about the ideas that will impact the industry the most in the next few years. It is not sure, whether the current trajectory of design will lead us to a better world or plunge us deeper into our pool of problems, redefining what "better" means, and taking a closer look at who is benefiting from design.

"Design for Future" is a seminar in which the students have to analyse different product design trends and predict the nature or design of product / system / service in near and far future.

2. **Learning objective**

The objective of the course is to train the student to foresee the future and prepare himself with require skill set and knowledge to design products in future.

This course also prepares the students on their communication skills and ability to convince through future predictions.

3. Course Content

- Trend Analysis
- Technology Forecasting
- Impact of Government policies on Product Design
- The student will select a product / system / service in consultation with the course leader and predicts the nature of existence of the same product / system / service in the near and far future. Student s have to present their concepts though power point presentations or visual boards.

4. Course Outcome

CO1: Understanding trend analysis and technology forecasting

CO2: Predicting future design through trend analysis.

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	3	2	1	3	3	0	0	0	0	3	0	3	2	0
CO2	3	3	2	1	3	3	0	1	3	1	3	0	1	2	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. Prerequisites

Understanding on History of Design

Reference Books:

1. The Design of Future Things, by Don Norman
2. Future Design, by Rory Hyde, Kieran Long, Mariana Pestan
3. Echoes of the Future: Rational Graphic Design & Illustration, by Robert Klanten, Hendrik Hellige
4. Design Futures, by Bradley Quinn
5. Futurism and Futurisms, by Pontus Hulten

Web Links:

1. https://www.fastcompany.com/90139617/9-ideas-shaping-the-future-of-design-according-to-ideo-microsoft-autodesk-mit-and-more
2. https://www.futuredesigns.co.uk/
3. https://www.yankodesign.com/2018/10/04/skills-you-will-need-for-the-future-of-industrial-design/

Online Videos:

1. https://www.youtube.com/watch?v=wQmwEjL6K1U
2. https://www.youtube.com/watch?v=33iYOoE1XVA
3. https://www.ted.com/talks/don_norman_on_design_and_emotion?language=en

Summer Internship **SIIB 4101** **C: L: T: P** :: 2:0:0:4

1. Course Description

This is a 6 weeks Industry internship where students be a part of industry and learn different processes. They also do small projects along with relevant departments.

2. Learning Objective

- To have trial experience of working for industry and understand realistic constraints.

3. Course Contents

- Get appointed in selected firm for industrial internship
- Complete 6 weeks internship work and get a certificate of completion

4. Course Outcomes

CO1: Student get a feel of working for industry.

CO2: Students will be able to relate academics with industry.

CO3: Students are able to contribute for industry.

CO4: Students learn a lot about technology.

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. Prerequisites and Materials

- Students should have basic understanding of design and prototyping

6. Prerequisites and Materials

- Students should have basic understanding of design and prototyping

Table: Correlation of POs & PSOs v/s COs

PO & PSO Vs CO	Develop Creative Mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Inter-Disciplinary Approach	Entrepreneurial Spirit	Team Work	Professional Ethics	Sustainable Solutions	Local & Global Context	Lifelong Learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	1	1	3	1	3	1	2	3	1	1	2	2	1	1
CO2	1	1	1	3	1	3	3	2	1	1	1	1	1	2	1
CO3	0	2	1	3	2	2	1	1	1	1	1	1	1	1	1
CO4	0	2	1	3	2	2	1	2	1	1	1	1	1	1	1

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

Project 5: System Design

Course Code: SDPJ 4130
Credit: 5
L-T-P: 1-0-8

6. Course Brief

System Design is the process of understanding how things, regarded as systems, influence one another within a whole. The nature of the whole system is always different from, and more than, the sum of its unassembled collection of parts. This course seeks to offer a design problem, which brings together aspects of people, technology and business within a specific ecosystem. The constituent parts of this ecosystem have to be identified, and the underlying problem should be addressed through the adoption of a systems thinking approach to problem solving.

7. **Learning Objective**

The primary goal of the course is to understand systems thinking and approaches in design. Specific objectives include:

- Enhancement of recursive thinking between abstraction and concretization in design processes
- Developing capability for rigorous but flexible understanding of domains of concern
- Developing ability for applying different system modeling methods

8. **Course Contents**

The module focus on system modeling methods that facilitate to observe, describe, analyze, predict or envision, design, prototype, and evaluate the impact and behavior of complex systems from different prospective. Topics include:

- Concept and definition of systems
- Viewpoints and aspects
- Types of systems and models
- Example systems such as interactive systems, information systems, natural systems, organizational systems, social systems, socio-technical systems

9. **Course Outcomes**

CO1: Demonstrate integrating components and design a harmonious system in a products, systems and services environment

CO2: To achieve a systems approach to product development by evolving modularity in elements.

CO3: Demonstrate factors that govern existence of a system and identify Components of a system & improvise to make it a better, more efficient and harmonious system.

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	0	3	1	1	0	3	1	3	3	0	3	0	3	0	0

CO2	2	2	2	1	0	3	0	3	2	2	3	0	0	1	1
CO3	2	2	2	1	0	3	0	3	2	2	3	0	0	1	1

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

10. **Prerequisites and Material**

12. Basic understanding of design Process & research methods and techniques
13. Laptop and Camera

Reference Books

1. Thinking in Systems: A Primer by Donella H. Meadows, Chelsea Green Publishing
2. An Introduction to General Systems Thinking by Gerald M. Weinberg, Dorset House
3. Systems Thinking Basics: From Concepts to Causal Loops by Virginia Anderson, Pegasus Communications
4. How to Think Like Leonardo da Vinci: Seven Steps to Genius Every Day by Michael J. Gelb, Dell
5. Meadows, D.H. (2008). Thinking in Systems: A Primer. Chelsea Green Publishers.
6. Senge, P.M. (2006). The Fifth Discipline: The Art & Practice of the Learning Organization. New York, Doubleday.
7. Sweeney, L.B. and Meadows, D. (2010). The Systems Thinking Playbook: Exercises to Stretch and Build Learning & Systems Thinking Capabilities. Chelsea Green Publishing.
8. Moggridge, B. (2006). Designing Interactions. MIT Press.
9. Buxton, B. (2007). Sketching User Experiences: Getting the Design Right and the Right Design. Morgan Kaufmann Publishers
10. Lidwell, W., K. Holden, et al. (2003). Universal Principles of Design. Rockport Publishers.
11. Lawson, Bryan (2002). How Designer's Think. Butterworth Publishers.
12. Ulrich, K. and Eppinger, S. (2008). Product Design & Development. McGraw-Hill.
13. Lockwood, T. (2009). Design Thinking: Integrating Innovation, Customer Experience and Brand Value. Allworth Press.

Web Links:

1. https://www.researchgate.net/publication/232871421_A_Review_of_Product-Service_Systems_Design_Methodologies
2. https://www.interaction-design.org/literature/article/service-design-design-is-not-just-for-products
3. http://www.cs.cmu.edu/~jhm/Readings/Morelli.pdf

Online Videos:

1. https://www.youtube.com/watch?v=OrPUJpHGWpA
2. https://www.youtube.com/watch?v=OKC5IaApZZs
3. https://www.youtube.com/watch?v=umWABit-wbk
4. https://www.youtube.com/watch?v=quLrc3PbuIw&list=PLMCXHnjXnTnvo6alSjVkgxV-

VH6EPyvoX

5. https://www.youtube.com/watch?v=wc5krC28ynQ

Surface Design: Color and Texture

Course Code: SDID 3018P
Credit: 3
L-T-P: 2-0-2

101. Course Brief:

In this course the students will be exposed to trends in context of Color Material and Finish. The CMF and trend forecasting industries provide insight to commercial design teams about technological, aesthetic and social developments, (often at the edges of the mainstream), that might effect how products should look. Even different history might imply for present day visual and material design. Trends, futures and Cultures also have a very deep impact on the material and other aspects of it.
Students will learn how to take inspiration from different aspects as mentioned above and see how it can be applied in how the products should look in the context of their use.

102. Learning Objective:

- Impact of various factors like, culture history, technology etc. on how the product should look.
- Different manufacturing techniques involved to impart a particular CMF on a particular product and surface.

103. Course Contents:

S. Theoretical

- Case studies on how colors have changed based on various factors
- Success stories from various fields for inspiration.
- Different manufacturing techniques required to get a particular CMF.

T. Practical/Tutorial

A student has to study and analyze a Culture, Event, Personality, Expression, and take out the essentials in terms of how they can impact the outlook of a product or space and apply them on a chosen product or space and iterate to come up with overall new CMF story of the selected object.

104. Course Outcomes

CO1: Students will gain knowledge about connection of Colors , materials and Finish with various factors like Economy, Culture, History etc.
CO2: Students will learn various techniques involved in getting and applying a particular Material, Color or Finish to a product or space.

CO3: Students will learn to express and connect Design and Emotion through surface of a product or a Space.

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	2	0	1	2	0	0	1	1	3	0	3	0	0	1	2
CO2	0	0	1	0	0	0	0	1	2	3	1	0	1	1	3
CO3	1	0	2	0	0	0	0	1	0	2	1	0	0	3	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

105. Prerequisites and Materials

- Students should have reading material on History and Cultural impact of artefacts.
- Students should be well versed with the learning from previous courses about material and processes.

Reference Books:-

41. Color Psychology and Color Therapy by FABER BIRREN
42. The Color Revolution REGINA LEE BLASZCZYK
43. Color and Space SANDU CULTURAL MEDIA
44. Historical Color Guide: Primitive to Modern Times with Thirty Plates in Color ELIZABETH BURRIS-MEYER

45. CMF Design – The Fundamental Principles of Colour, Material and Finish Design

Web Link:-

32. https://study.com/academy/lesson/color-meanings-in-different-cultures.html
33. https://www.canva.com/learn/color-meanings/
34. https://www.sapiens.org/language/color-perception/
35. https://www.entrepreneur.com/article/233843

Online Videos:

1. https://www.youtube.com/watch?v=xknQuL01ouQ
2. https://www.youtube.com/watch?v=lIOr-aZ_ZHk
3. https://www.youtube.com/watch?v=w_ails-RBnw
4. https://www.youtube.com/watch?v=rk1SPDLnA7A
5. https://www.youtube.com/watch?v=xS53BPUDX8Y
6. https://www.youtube.com/watch?v=J755dlhuP7o
7. https://www.youtube.com/watch?v=N61PU2ZkYtA

Mechanism and Robotics

Course Code: SDID 4011P
Credit: 3
L-T-P: 2-0-2

1. Course Brief

Usage of advanced and complex products in day to day lifestyle is very common in 21st century. A designer must be aware of the internal mechanisms and electrical components used inside the product. Introduction of robotics into consumer durable product is no more a surprise element in design. The knowledge of robotics will definitely enrich the understanding of the design student to design product in future. A designer, to be effective has to prove the practical applicability of his design. To do this, some amount of engineering inputs are required as a part of design studies. This course aims at equipping the designer with basic knowledge of simple mechanics and electricity.

2. Learning outcome

- To understand different types of mechanical machines and mechanisms exists so that designs can be made lot more functional
- To understand power of robotics to make IOT based products
- To demonstrate design of simple products by using mechanisms and robotics

3. Course Content:

- **Simple machines**
- **Applications based on simple machines- mechanical advantage**
- **Transfer of motion**
- **Devices used in transfer of motion**

- **Gears and its types : features of each type**
- **Ratchet and pinion**
- **Linkages**
- **Cams**
- Introduction to Robotics - Basic concepts of robotics (Laws of robotics, robotic systems, Automation and robotics, Robot anatomy Robot configurations, Robot motions, Joint notation scheme) ,Robot Manipulators kinematics , Forward and inverse kinematics, Spatial resolution, robot specification, Robot drives, electric drive, Hydraulic, pneumatic drives, Point to point control, continuous path control
- Sensor - Types of sensors - contact, position and displacement sensors , Force and torque sensors Robot Programming, Mathematical elements for computer graphics, Proximity and range sensors, acoustic sensors , Sensing and digitizing' image processing and analysis
- ROLE OF ROBOTICS IN DESIGN: Defining the Problem, Design characteristics, construction and testing of design using simulation. Methodology used in design construction. Prototype validation. Applications: Rapid prototyping using 3D printers, Building Constructions, Automobile Industries, Medical sector, Electronic sectored.

4. Course Outcomes

CO1: Demonstrate understanding of simple machines & usage of mechanical advantage.
CO2: Demonstrate understanding of kinematics in applications in transfer of motions in products
CO3: Understanding basic robotics principles and scope of robotics in product design
CO4: Demonstrate understandings by using & creating in model/product

Table: Correlation of POs & PSOs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**

CO1	CO1	0	2	1	3	0	2	0	1	0	0	3	0	3	0
CO2	CO2	1	0	1	0	2	2	0	1	0	1	1	0	0	2
CO3	CO3	0	2	1	3	0	2	0	1	0	0	3	0	3	0
CO4	CO4	1	0	1	0	2	2	0	1	0	1	1	0	0	2

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. **Prerequisites and Materials**
   - NA-

2023-27

Year 4

Semester 8

B.Des_Industrial & Product Design

1. Course Brief:

Design projects are the backbone of the Industrial Design's bachelor and master's program. Within these projects, students integrate and develop their competencies in an authentic context, often including a real (business) client. During this final Semester, Students will be working on the Final Project, which would exhibit their understanding, and learning throughout the previous three semesters.

The Final Project topic will be decided during the course of time. This project will be the most important part of the whole course since it will give the final touch to the design learning of the student. Students shall be working individually to give shape to the designing of an Industrial product under the given topic.

The jury shall evaluate progress on project periodically through presentation at various stages. The deliverables of the project shall be project report, sketches, final and mock-up models, design drawings, photographs and the final presentation including techno-commercial viability of the proposed new/improved designs.

All systems and procedures as applicable to the internship shall be followed. Student will have the external guide (at the place of internship) and an internal mentor.

Those students not able to find the internships (in a rare case) will complete the project with internal guide at campus.

2. Learning Objective:

The objective of the course to prepare the student to handle an industrial design project independently and complete all the deliverables by following the complete design process.

3. **Course Contents:**

There is no classroom teaching included in this course, whereas the student will follow the entire design process and demonstrate the learning from all previous module to come out with a design solution.

4. **Course Outcomes**

CO1: Students should address design problems for Product/System design and IT solutions.

CO2. In this course, students should able to understand critical aspects (e.g. control, ethics etc.) of planed product/system to satisfy the identified design problem

CO3. They should able to strategies optimum utilization of different channels to a certain context, come up with a design solution and validate the design with proper user segment

Table: Correlation of POs v/s COs

	Develop a creative mind-set	Empathy	Creative Articulation	Discovery to Realization	Design for Future	Multi-Disciplinary Approach	Entrepreneurial Spirit	Team work	Professional Ethics	Sustainable solutions	Local and Global context	Lifelong learning	Product, User and Market Research	Form Generation, Styling, Aesthetic Appeal	Tangible Prototyping of a Product / Package / System
PO/ CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	1	3	1	3	0	3	1	3	0	0	3	1	3	0	0
CO2	2	3	2	2	3	3	2	2	2	3	3	1	1	2	1
CO3	1	1	2	2	2	1	0	0	1	2	1	0	0	1	3

0: No Relation 1: Slight (Low) 2: Moderate (Medium) 3: Substantial (High)

5. Prerequisites and Materials

- Students should have understanding of research, concept generation and prototyping
- The student should have completed all the previous course learnings

Reference Books:-

1. Designing Design – Kenya Hara
2. Universal Principles of Design by William Lidwell, Kritina Holden, and Jill Butler.
3. Cradle to Cradle: Remaking the Way We Make Things by William McDonough and Michael Braungart.
4. Lateral Thinking: Creativity Step by Step by Edward De Bono.
5. The Art of Innovation: Lessons in Creativity from IDEO, America's Leading Design Firm by Tom Kelley.
6. Design Secrets: Products 1 and 2: 50 Real-Life Product Design Projects Uncovered by Lynn Haller and Cheryl Dangel Cullen, and edited by Industrial Designers Society of America.
7. Product Design and Development by Karl T. Ulrich and Steven D. Eppinger.

Web URL:-

1. https://www.crowdspring.com/product-design/
2. https://www.nickchubbdesign.com/final-major-project-ideas/
3. https://pixel77.com/top-25-product-design-projects-2013/
4. https://www.creaform-engineering.com/en/expertises/design/industrial-design
5. https://www.design-concepts.com/work/capability/industrial-design

Online Videos:-

1. https://www.youtube.com/watch?v=foz6YniB588
2. https://www.youtube.com/watch?v=W6EgoiPxNDs
3. https://www.youtube.com/watch?v=L1pBhHjGKvI

4. https://www.youtube.com/watch?v=GYkb6vfKMI4
5. https://www.youtube.com/watch?v=urcT3rUEfCU
6. https://www.youtube.com/watch?v=Ou4UWmFLcSc

Thank you