VIT®

Vellore Institute of Technology

(Deemed to be University under section 3 of UGC Act, 1956)

VIT SCHOOL OF DESIGN

(V-SIGN)

Bachelor of Design

(Industrial Design)

(B.Des Industrial Design)

Curriculum

(*2018-2019 admitted students*)

VISION STATEMENT OF VELLORE INSTITUTE OF TECHNOLOGY

Transforming life through excellence in education and research.

MISSION STATEMENT OF VELLORE INSTITUTE OF TECHNOLOGY

World class Education: Excellence in education, grounded in ethics and critical thinking, for improvement of life.

Cutting edge Research: An innovation ecosystem to extend knowledge and solve critical problems.

Impactful People: Happy, accountable, caring and effective workforce and students.

Rewarding Co-creations: Active collaboration with national & international industries & universities for productivity and economic development.

Service to Society: Service to the region and world through knowledge and compassion.

VISION STATEMENT OF VIT SCHOOL OF DESIGN (V-SIGN)

To be a world renowned school for producing creative professionals in the field of Art, Design, Multimedia, and Animation.

MISSION STATEMENT OF VIT SCHOOL OF DESIGN (V-SIGN)

- To nurture industry-ready designers through holistic training in the field of Art, Design, Multimedia and Animation.
- To innovate newer methods of problem solving in the field of design using state-of-the-art research facilities.
- To produce confident & skilled professionals, trend–setters and leaders in the field of design.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

1. Graduates will be able to independently carryout complete Industrial Design considering aesthetics, ergonomics, etc.,

2. Graduates will be able to work in multicultural cross discipline teams effectively.

3. Graduates will be able to communicate the design and other technical aspects effectively using various tools.

B. Des Industrial Design

PROGRAMME OUTCOMES (POs)

PO_01: Having an ability to apply knowledge of mathematics, science, and engineering

PO_02: Having a clear understanding of the subject related concepts and of contemporary issue

PO_03: Having ability to design a component or a product applying all the relevant standards and with realistic constraints, including public health, safety, culture, society and environment.

PO_04: An ability to design and conduct experiments, as well as to analyse and interpret data.

PO_05: Having problem-solving ability solving social issues through design.

PO_06: Having a clear understanding of professional and ethical responsibility

PO_07: Having cross-cultural competency exhibited by working in teams.

PO_08: Inculcating curiosity for lifelong learning about design.

PO_09: Having Sense-Making Skills of creating unique insights in what is being seen or observed (Higher level thinking skills.

PO_10: Having creativity and design thinking capability

PO_11: Having a good cognitive load management skills related to project management and finance

PO_12: Having virtual expression and digital foot printing ability

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B. Des Industrial Design

CREDIT STRUCTURE

Category-wise Credit distribution

Category	Credits
University core (UC)	**63**
Programme core (PC)	**45**
Programme elective (PE)	**60**
University elective (UE)	**12**
Bridge course (BC)	-
Total credits	**180**

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B. Des Industrial Design

DETAILED CURRICULUM

University Core

S. No.	Course Code	Course Title	L	T	P	J	C
1.	MEE1001	Engineering Drawing	1	0	4	0	3
2.	CSE1001	Problem Solving and Programming	0	0	6	0	3
3.	CHY1002	Environmental Sciences	3	0	0	0	**3**
4.	MAT1002	Mathematics for Designers	2	0	0	4	**3**
5.	PHY1004	Physics for Designers	2	0	0	4	**3**
6.	CHY1006	Chemistry for Designers	2	0	0	4	**3**
7.	ENG1000/ ENG2000	Foundation English I Foundation English II	0	0	4	0	**2**
8.	ENG1901/ ENG1902/ ENG1903	Technical English I Technical English II Advanced Technical English	0 0 0	0 0 0	4 4 2	0 0 4	**2**
9.	HUM1021	Ethics and Values	2	0	0	0	**2**
10.	MGT1022	Lean Startup Management	1	0	0	4	**2**
11.	MEE1025	Design Workshop	0	0	4	4	**3**
12.	BDE1032	Summer Project on Social Concern	0	0	0	0	**3**
13.	FLC4097	Foreign Language (basket)	0	0	0	0	2
14.	EXC4097	Personality Development (Co/Extra-curricular Activity)	0	0	0	0	**2**
15.	BDE3099	Industry Internship (Summer)	0	0	0	0	**3**
16.	STS4097	Soft Skills	0	0	0	0	6
17.	BDE4099	Capstone Project	0	0	0	0	**20**

B. Des Industrial Design

Programme Core

S. No.	Course Code	Course Title	L	T	P	J	C
1.	BDE1001	Design Fundamentals – 2D	0	0	4	4	**3**
2.	BDE1002	Image Representation Techniques	0	0	4	4	**3**
3.	BDE1003	Design Studio – Problem Identification	0	0	4	4	**3**
4.	BDE1004	Fundamentals of Ergonomics	2	0	2	0	**3**
5.	BDE1005	Electronics for Industrial Design	2	0	2	0	**3**
6.	BDE1006	Design History	1	2	0	4	**3**
7.	BDE1007	Design and Society	1	2	0	4	**3**
8.	BDE1008	Form Studies	0	0	4	4	**3**
9.	BDE1009	Product Design	0	0	4	4	**3**
10.	BDE1011	Materials and Processes – Metals	2	0	0	4	**3**
11.	BDE1013	Materials and Processes - Non-metals	2	0	0	4	**3**
12.	BDE2001	Advanced Image Representation Techniques	0	0	4	4	**3**
13.	BDE2002	Design Fundamentals – 3D	0	0	4	4	**3**
14.	BDE2003	Design Studio – Problem Analysis	0	0	4	4	**3**
15.	BDE3002	Smart Product Design	0	0	4	4	**3**

B. Des Industrial Design

Programme Elective

S. No.	Course Code	Course Title	L	T	P	J	C
1.	BDE1010	Computer Modelling and Simulation Techniques	0	0	4	4	**3**
2.	BDE1012	Graphic Design	0	0	4	4	**3**
3.	BDE1014	Creative Explorations Techniques	0	0	4	4	**3**
4.	BDE1015	Product Detailing and Mechanisms	2	0	0	4	**3**
5.	BDE1016	Collaborative Design Project	0	0	0	12	**3**
6.	BDE1017	Redesign Project	0	0	0	8	**2**
7.	BDE1018	Pottery	0	0	4	4	**3**
8.	BDE1019	Carpentry	0	0	4	4	**3**
9.	BDE1020	Design Thinking	1	2	0	4	**3**
10.	BDE1021	Typography	0	0	4	4	**3**
11.	BDE1022	Packaging Design	0	0	4	4	**3**
12.	BDE1023	Product Semiotics	2	2	0	0	**3**
13.	BDE1024	Origami	0	0	4	4	**3**
14.	BDE1025	User Experience Design	0	0	4	4	**3**
15.	BDE1026	Indian Symbology	2	2	0	0	**3**
16.	BDE1027	Interaction Design	0	0	4	4	**3**
17.	BDE1028	Service Design	0	0	4	4	**3**
18.	BDE1029	Game Design	0	0	4	4	**3**
19.	BDE1030	System Design Project	0	0	4	4	**3**
20.	BDE1031	Exhibition Design	0	0	4	4	**3**
21.	BDE2004	Applied Ergonomics	2	0	2	0	**3**
22.	BDE3001	Electronic Product Design	0	0	4	4	**3**

23.	BDE3003	Advanced Form Studies	0	0	4	4	**3**
24.	BDE3004	New Product Development	1	2	0	4	**3**
25.	BDE3005	Sustainable Product Design	0	0	4	4	**3**
26.	BDE3006	Toy Design	0	0	4	4	**3**
27.	BDE3007	Medical Product Design	0	0	4	4	**3**
28.	BDE3008	Bio Inspired Product Design	1	2	0	4	**3**
29.	BDE3009	Mobility Design	0	0	4	4	**3**
30.	BDE4001	Advanced Smart Product Design	0	0	4	4	**3**
31.	BDE4002	Advanced Computer Modelling and Simulation Techniques	0	0	4	4	**3**
32.	MGT1054	Product Planning and Strategy	2	2	0	0	**3**
33.	MGT1055	Design Management	2	2	0	0	**3**

University Electives

(From the respective baskets)

Sl.No	**Course Title**	**Credits**
1	University Elective - I	3
2	University Elective - II	3
3	University Elective - III	3
4	University Elective - IV	3

SYLLABUS FOR
UNIVERSITY CORE
COURSES

Course code	ENGINEERING DRAWING	L	T	P	J	C
MEE1001		1	0	4	0	3
Pre-requisite		Syllabus version				
		2.0				

Course Objectives:

1. Understand and escalate the importance of basic concepts and principles of Engineering Drawing (components, sections, views, and graphical representation).
2. Enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient.
3. Develop the ability to communicate with others through the language of technical drawing and sketching.
4. Ability to read and interpret engineering drawings created by others.
5. Ability to draw orthographic projections and sections.
6. Develop an understanding for size specification procedures and use of SI and traditional units of linear measure.

Expected Course Outcome:

Upon successful completion of the course the students will be able to

1. Apply BIS and ISO Standards in Engineering Drafting.
2. Graphically construct mathematical curves in engineering applications.
3. Visualize geometrical solids in 3D space through Orthographic Projections
4. Construct isometric scale, isometric projections and views.
5. Draw sections of solids including cylinders, cones, prisms and pyramids.
6. Draw projections of lines, planes, solids, isometric projections and sections of solids including cylinders, cones, prisms and pyramids using Mini-Dafter and CAD.
7. Construct orthographic projections from pictorial views.

Module:1	Lettering and Dimensioning	1 hours

Introduction, lettering practice, Elements of dimensioning - systems of dimensioning.

Module:2	Geometric Constructions	2 hours

Free hand sketching, Conic sections, Special curves.

Module:3	Projection of Points and Projection of Lines	2 hours

Projection of Points: First and Third Angle Projections; Projection of points.
Projection of Lines: Projection of straight lines (First angle projection only); Projection of lines inclined to one plane and both planes, true length and true inclinations.

Module:4	Projection of Solids and Section of Solids	3 hours

Projection of solids: Classification of solids, Projection of solids in simple position, Projection of solids inclined to one plane.
Sections of Solids: Right regular solids and auxiliary views for the true shape of the sections.

Module:5	Development of Surfaces	2 hours

Development of surfaces for various regular solids.

Module:6	Isometric Projection and Perspective Projection	2 hours

Isometric Projection: Isometric scales, Isometric projections of simple and combination of solids;
Perspective Projection: Orthographic representation of a perspective views – Plane figures and simple solids - Visual ray method.

Module:7	**Orthographic Projection**		**2 hours**
Module content			
Module:8	**Contemporary issues:**		**1 hours**
	Total Lecture hours:	**15 hours**	

Text Book(s)	
1.	Venugopal K and Prabhu Raja V, "Engineering Graphics", New AGE International Publishers, 2015.
Reference Books	
1.	N. D. Bhatt, Engineering Drawing, Charotar publishing House, 2012.
2	Natarajan, K. V., A Text book of Engineering Graphics, Dhanalakshmi Publishers, 2012.
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar	

List of Challenging Experiments (Indicative)		
1.	Identifying the incorrect dimensioning and correct it as per BIS standards for Engineering Components.	4 hours
2.	Tutorials on free hand sketching of the plan view of stadium, garden, etc.,	4 hours
3.	Tutorials on geometric constructions like conics and special curves for projection of cricket ball, missile projection, etc.,	4 hours
4.	Representation of orthographic projection of points	4 hours
5.	Representation of orthographic projection of lines (First angle projection only) inclined to one plane and projection of lines inclined to both the planes- solving problems like electrical bulbs hanging from the roof, finding the shortest distance between fan to electrical switch board, etc.,	8 hours
6.	Sketching orthographic projection of solids in simple position and projection of solids inclined to one plane for household accessories and objects.	8 hours
7.	Drawing the auxiliary views, orthographic views and true shape of sectioned regular solids for household accessories and objects.	4 hours
8.	Development of lateral surfaces of the regular shapes and sectioned shapes for water cans, refrigerator, cylinder container, funnel, etc.,	4 hours
9.	Conversion of orthographic views to isometric views for engineering components.	8 hours
10.	Tutorial problems on perspective projection of plane figures and simple solids for train with track, landscape, etc.,	4 hours
11.	Conversion of pictorial drawing into orthographic projection for engineering components, architectural structures, etc.,	8 hours
	Total Laboratory Hours	60 hours

Mode of assessment:			
Recommended by Board of Studies	03-03-2018		
Approved by Academic Council	No. 49	Date	15-03-2018

Course code	PROBLEM SOLVING AND PROGRAMMING	L	T	P	J	C
CSE1001		0	0	6	0	3
Pre-requisite		Syllabus version				
		1.0				

Course Objectives:

1. To develop broad understanding of computers, programming languages and their generations
2. Introduce the essential skills for a logical thinking for problem solving
3. To gain expertise in essential skills in programming for problem solving using computer

Expected Course Outcome:

1.Understand the working principle of a computer and identify the purpose of a computer programming language
2. Learn various problem solving approaches and ability to identify an appropriate approach to solve the problem
3. Differentiate the programming Language constructs appropriately to solve any problem
4. Solve various engineering problems using different data structures
5. Able to modulate the given problem using structural approach of programming
6. Efficiently handle data using at les to process and store data for the given problem

Text Book(s)

1. John V. Guttag., 2016. Introduction to computation and programming using python: with applications to understanding data. PHI Publisher.

Reference Books

1. Charles Severance.2016.Python for everybody: exploring data in Python 3, Charles Severance.
2. Charles Dierbach.2013.Introduction to computer science using python: a computational problem-solving focus. Wiley Publishers.Mode of Evaluation: PAT / CAT/ FAT

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar

List of Challenging Experiments (Indicative)

1.	Steps in Problem Solving Drawing Flowchart using yEd tool/Raptor Tool	4 hours
2.	Introduction to Python, Demo on IDE, Keywords, Identifiers, I/O Statements, Simple Program to display Hello world in Python.	4 hours
3.	Operators and Expressions in Python	4 hours
4.	Algorithmic Approach 1: Sequential	2 hours
5.	Algorithmic Approach 2: Selection (if, elif, if.. else, nested if else	2 hours
6.	Algorithmic Approach 3: Iteration (while and for)	4 hours
7.	Strings and its Operations	2 hours
8.	Regular Expressions	2 hours
9.	List and its operations.	2 hours
10.	Dictionaries: operations	2 hours
11.	Tuples and its operations	2 hours
12.	Set and its operations	2 hours
13.	Functions, Recursions	2 hours
14.	Sorting Techniques (Bubble/Selection/Insertion)	4 hours
15.	Searching Techniques : Sequential Search and Binary Search	3 hours
16.	Files and its Operations	4 hours
	Total Laboratory hours	**45 hours**

Mode of assessment:

Recommended by Board of Studies	04-04-2014		
Approved by Academic Council	No. 38	Date	23-10-2015

CHY1002	Environmental Sciences	L	T	P	J	C
		3	0	0	0	3
Pre-requisite		**Syllabus version**				
		1.1				

Course Objectives:

1. To make students understand and appreciate the unity of life in all its forms, the implications of life style on the environment.
2. To understand the various causes for environmental degradation.
3. To understand individuals contribution in the environmental pollution.
4. To understand the impact of pollution at the global level and also in the local environment.

Expected Course Outcome: Students will be able to

1. R**ecognize** the environmental issues in a problem oriented interdisciplinary perspective
2. U**nderstand** the key environmental issues, the science behind those problems and potential solutions.
3. D**emonstrate** the significance of biodiversity and its preservation
4. I**dentify** various environmental hazards
5. D**esign** various methods for the conservation of resources
6. F**ormulate** action plans for sustainable alternatives that incorporate science, humanity, and social aspects
7. Have k**nowledge** enabling them to make sound life decisions as well as enter a career in an environmental profession or higher education.

Module:1	**Environment and Ecosystem**	**7 hours**

Key environmental problems, their basic causes and sustainable solutions. IPAT equation. Ecosystem, earth – life support system and ecosystem components; Food chain, food web, Energy flow in ecosystem; Ecological succession- stages involved, Primary and secondary succession, Hydrarch, mesarch, xerarch; Nutrient, water, carbon, nitrogen, cycles; Effect of human activities on these cycles.

Module:2	**Biodiversity**	**6 hours**

Importance, types, mega-biodiversity; Species interaction - Extinct, endemic, endangered and rare species; Hot-spots; GM crops- Advantages and disadvantages; Terrestrial biodiversity and Aquatic biodiversity – Significance, Threats due to natural and anthropogenic activities and Conservation methods.

Module:3	**Sustaining Natural Resources and Environmental Quality**	**7 hours**

Environmental hazards – causes and solutions. Biological hazards – AIDS, Malaria, Chemical hazards- BPA, PCB, Phthalates, Mercury, Nuclear hazards- Risk and evaluation of hazards. Water footprint; virtual water, blue revolution. Water quality management and its conservation. Solid and hazardous waste – types and waste management methods.

Module:4	**Energy Resources**	**6 hours**

Renewable - Non renewable energy resources- Advantages and disadvantages - oil, Natural gas, Coal, Nuclear energy. Energy efficiency and renewable energy. Solar energy, Hydroelectric power, Ocean thermal energy, Wind and geothermal energy. Energy from biomass, solar- Hydrogen revolution.		
Module:5	**Environmental Impact Assessment**	**6 hours**
Introduction to environmental impact analysis. EIA guidelines, Notification of Government of India (Environmental Protection Act – Air, water, forest and wild life). Impact assessment methodologies. Public awareness. Environmental priorities in India.		
Module:6	**Human Population Change and Environment**	**6 hours**
Urban environmental problems; Consumerism and waste products; Promotion of economic development – Impact of population age structure – Women and child welfare, Women empowerment. Sustaining human societies: Economics, environment, policies and education.		
Module:7	**Global Climatic Change and Mitigation**	**5 hours**
Climate disruption, Green house effect, Ozone layer depletion and Acid rain. Kyoto protocol, Carbon credits, Carbon sequestration methods and Montreal Protocol. Role of Information technology in environment-Case Studies.		
Module:8	**Contemporary issues**	**2 hours**
Lecture by Industry Experts		
	Total Lecture hours:	**45 hours**

Text Books

1. G. Tyler Miller and Scott E. Spoolman (2016), Environmental Science, 15th Edition, Cengage learning.
2. George Tyler Miller, Jr. and Scott Spoolman (2012), Living in the Environment – Principles, Connections and Solutions, 17th Edition, Brooks/Cole, USA.

Reference Books

1. David M.Hassenzahl, Mary Catherine Hager, Linda R.Berg (2011), Visualizing Environmental Science, 4thEdition, John Wiley & Sons, USA.

Mode of evaluation: Internal Assessment (CAT, Quizzes, Digital Assignments) & FAT

Recommended by Board of Studies	12.08.2017		
Approved by Academic Council	No. 46	Date	24.08.2017

Course code	MATHEMATICS FOR DESIGNERS	L	T	P	J	C
MAT1002		3	0	0	0	3
Pre-requisite		Syllabus version				
		1.0				

Course Objectives:

The aim of this course is to provide a solid foundation of mathematics in Industrial Design

Expected Course Outcome:

At the end of the course the student should be able to
[1] Understand matrices, its properties and applications
[2] Understand basic trigonometric expansions and its applications
[3] Apply differential calculus for finding extrema and curve-tracing, and solve differential equations
[4] Apply integration methods for measuring areas and volumes
[5] Learn how to use analytical geometry in design
[6] Understand fractals, Fibonacci series, Golden ratio and their applications in pattern making.

Module:1	Matrices in Design	7 hours

Introduction to Matrices from Designer's perspective –Symmetric matrices and determinants –Elementary transformations - Solution of a system of linear equations by inversion method– Rank of a matrix – Eigen values and eigen vectors of matrices – Basics of MATLAB

Module:2	Trigonometry	6 hours

Trigonometric ratios - de Moivre's theorem- Expansion of sin $n\theta$, cos $n\theta$ and tan $n\theta$ - Hyperbolic and inverse hyperbolic functions - Applications to heights and distances

Module:3	Differential Calculus	7 hours

Derivative and its physical interpretation – Rules of differentiation - Higher order derivatives – Local maxima and minima – Concavity and points of inflection – Elementary concepts of curve tracing - Elementary applications to rate flow problems - MATLAB Tutorial

Module:4	Differential Equations	6 hours

Formation and solution of differential equations: variable separable, exact and linear equations - Solution of second order homogenous differential equations with constant coefficients – Applications to electrical and mechanical circuits

Module:5	Integral Calculus	6 hours

Definite integral and its properties – Applications to averages, areas between plane curves, volumes of solids and solids of revolution - MATLAB Tutorial

Module:6	Analytic Geometry	7 hours

Direction cosines and direction ratios - Plane, straight line and sphere and their vector representation - Shortest distance between two skew lines – Surfaces by spherical and cylindrical polar coordinates – Basic shapes of solids

Module:7	Proportions and Fractals	4 hours

Golden proportions and construction of Golden spiral – Basic concepts of Fractals

Module:8	**Expert Lecture** on Mathematics for Designers		**2 hours**
	Total Lecture hours:	**45 hours**	

Text Book(s)	
1.	**Advanced Engineering Mathematics**, Dennis G Zill, Warren S Wright, 6th Edition, Jones & Bartlett Learning, (2017)
2.	**Single Variable Calculus: Concepts and Contexts,** James Stewart, 4th Edition**,** Brooks/Cole, Cengage Learning, (2009)
3.	**Plane Trigonometry,** Loney S. L., 14th Edition, Arihant Publications, (2016)
4.	**Fractals and Chaos - An Illustrated Course,** Paul S Addison, CRC Press, (1997)
Reference Books	
1.	**Calculus and Analytic Geometry**, George B Thomas, Jr., Ross L. Finney, 9th Edition, Pearson, (2002)
2.	**Geometry of Design – Studies in proportion and Composition,** Kimberly Elam, 2nd Revised Updated Edition, Princeton Architectural Press, (2011)
3.	**Higher Engineering Mathematics,** B.S. Grewal, 44th Edition, Khanna Publishers, (2018)
4.	**MATLAB Primer,** Timothy A. Davis Kermit Sigmon, 7th Edition, CRC Press, (2005)

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar			
Mode of assessment:			
Recommended by Board of Studies	03-03-2018		
Approved by Academic Council	No. 49	Date	15-03-2018

Course code	Physics for Designers	L	T	P	J	C
PHY 1004		3	0	0	0	3
Pre-requisite		Syllabus version				
		1.00				

Course Objectives:

1. To develop understanding of deterministic design.
2. To apply principles of Physics and engineering to an iterative cycle of product design, Laws governing machine elements.
3. Learn to apply and use deterministic design to create machine modules and compare with analytical module.

Expected Course Outcome:

1. Analyze the deterministic design using the physical quantities.
2. Explain acoustic principles in terms of designing aspects.
3. Apply the concepts of thermodynamics and heat transfer techniques.
4. Develop deterministic design using optical image formation principles
5. Apply Electric, electromagnetics and mechanics for deterministic design of automated systems
6. Recall the contemporary issues

Module:1	Technical Mechanics:	9 hours

Introduction of Physics from Designer Perspective. Physical quantities, Scalars and vectors, Vectors in 3-D, Static equilibrium for a particle moment of a force, Equivalent force systems: distributed loads, Equilibrium of rigid bodies and the analysis of trusses, Internal forces, Dry friction, Belts, and centre of gravity, Moment of inertia, Pure bending, Shear stress in beams, Beams with axial loads, Torsion, Stress-element and plane stress, Rectilinear motion, Curvilinear motion Newton's laws.

Module:2	Acoustics:	6 hours

Waves in media, Superposition of waves, Standing waves, Sound intensity level, Harmonics and the quality of sound, Production and detection of ultrasonic and infrasonic waves and applications, Doppler Effect**.** Demonstrations of Acoustics

Module:3	Thermodynamics:	6 hours

Changes of state and their description, Molecular heat theory state equation of ideal gases, Major terms of thermodynamics, Laws of thermodynamics, Heat propagation, Entropy, Carnot cycles, Thermodynamics scale of temperature, Basics of Finite time thermodynamics. Demonstrations of Heat Transfer

Module:4	Optics:	6 hours

Fermat's Principle, General theory of image formation, Aberration in images, Interference of a light, Fresnel diffraction, Double refraction and optical rotation, Diffraction gratings, Optical instruments- Entrance and exit - pupils.

Module:5	Solids and structures:	5 hours

Basic crystallography, Lattice and Basis, Crystal structure, Materials by design, Artificial Structures, Examples.Properties of bonding and factors affecting the bonding between base materials and adhesives specific to metals, polymers, ceramics, wood and leather etc.

Module:6	Electro Mechanics:	5 hours

DC circuits, Electric field (capacitors), Magnetic field (induction), Electromagnetics, Single phase alternating current (RLC circuits), Producing 3-phase voltage and its characteristics. Star and delta connection, Basics of electronics, semiconductor devices (diodes, thyristors, transistors, etc.),Example: Robotics integration of electrical and mechanical concepts

Module:7	Basics of Relativistic Concepts:	6 hours

Basic concepts of quantum mechanics, Photoelectric effect, Uncertainty relation, Basics of relativistic physics (mass growth, mass-energy relationship). Examples: virtual gaming concepts.

Module:8	**: LECTURE BY INDUSTRY EXPERTS**		**2 hours**
	Total Lecture hours:	**45 hours**	

Text Book(s)

1. Basic Physics, Kenneth W Ford, World Scientific, (2017).
2. Basic Physics, Karl F. Kuhn, John Wiley & Sons Inc, (2017).
3. University Physics, Sears and Zemansky, Pearson India, 13th Edition, (2013).
4. Concepts of Modern Physics, Arthur Beiser, Shobhit Mahajan, S. Rai Choudhury, McGraw Hill Education; 7th Edition (2017).
5. Fundamentals of Electric Circuits, Alexander and Sadiku, 4th Edition, Mc Graw-Hill, (2009).

Reference Books

Reference Books

1.University Physics: Mechanics, Sears and Zemansky's, Pearson India, 12/Edition, (2011).
2. The Physics of Sound, Richard E. Berg & David G. Stork, Pearson, (2011).
3. Heat and Thermodynamics, Mark Zemansky & Richard Dittman, 8th Edition, Mc Graw Hill,(2017).
4. Fundamentals of Optics, Francis Arthur Jenkins, Mc Graw Hill, 4th Edition, (2015).
5. Mechanics of Solids and Structures, David W A Rees, World Scientific, (2000)
7. Fundamentals of Electronic Devices and Circuits, David A. Bell, Oxford University Press; 5th Edition (2009).
8. Introduction to Special Relativity, Robert Resnick, Wiley; 1st Edition (2007).
9. Fundamentals of Special and General Relativity, K.D. Krori, PHI (2010).

Mode of Evaluation: Internal Assessment (CAT, FAT and Non-contact hour project)

Recommended by Board of Studies	**03-03-2018**		
Approved by Academic Council	No. 49	Date	**Date: 15-03-2018**

Course code	Chemistry for Designer	L	T	P	J	C
CHY1006		3	0	0	0	3
Pre-requisite	Chemistry of 12th standard or equivalent	Syllabus version				
		1.0				

Course Objectives:

- To infuse designing concepts in chemistry
- To lay foundation for practical application of chemistry for designers

Expected Course Outcome:

- To understand and analyze the importance of modern materials from material perspective and also get to know the structural features of materials which are made out of specific chemical compounds.
- Evaluate the causes of metallic corrosion and apply the methods for corrosion protection of Metals
- Evaluate the electrochemical energy storage systems such as lithium batteries, fuel cells and solar cells, and design for usage in electrical and electronic applications
- Assess the quality of different adhesives used in the manufacturing of materials
- Analyze the properties of different colorants and demonstrate their usefulness in the manufacturing of materials useful for designing any specific components which would give aesthetic appearance
- To assimilate the importance of contemporary materials from technological advancement side. This offers student to come out with novel materials for day to day use.

Module:1	BASICS OF MATERIALS	7 hours

Introduction to engineering materials – significance of structure property correlations in all selected materials, Unit Cells, Metallic Crystal Structures, Density Computations, Crystal Systems, Crystallographic Points, Crystallographic Directions, Crystallographic Planes, Linear and Planar.

Densities, Close-Packed Crystal Structures, Crystalline and Non-crystalline Materials, Single Crystals, Polycrystalline Materials, Imperfection in solids – Point, Line, Surface and Volume defects - Polymorphism and Allotropy

Module:2	CORROSION AND PREVENTION	7 hours

Dry and wet corrosion - detrimental effects to buildings, machines, devices & decorative art forms, emphasizing Differential aeration, Pitting, Galvanic and Stress corrosion cracking; Factors that enhance corrosion and choice of parameters to mitigate corrosion. Corrosion protection - cathodic protection – sacrificial anodic and impressed current protection methods

Module:3	METAL FINISHING-COATING	5 hours

Importance and methods of metal finishing. Electroplating: Principle, factors and process. Electroplating of Cu, Au and Ni. Electroless plating of Cu, Ni and Nickel on Al.

PVD and CVD. Application of coating in making finished materials.

Module:4	ELECTROCHEMICAL ENERGY SYSTEMS	6 hours

Brief introduction to conventional primary and secondary batteries; High energy electrochemical energy systems: Lithium batteries – Primary and secondary, its Chemistry, advantages and applications.

Solar cells – Types – Importance of silicon single crystal, polycrystalline and amorphous silicon solar cells, dye sensitized solar cells - working principles, characteristics and application in the area of sustainable energy creation.

Module:5	BASICS OF POLYMER AND ADHESIVES – BONDING TECHNOLOGY	7 hours

Difference between thermoplastics and thermosetting plastics; Engineering application of plastics - ABS, PVC, PTFE and Bakelite; Conducting polymers- Polyacetylene- Mechanism of conduction – applications

Classification: Thermosetting and thermoplastic synthetic resins; adhesive action; bonding process: adherends assembly of adhesive coated adherends and conditioning after bonding, development of adhesive strength. Physical and chemical factors influencing adhesive action

Module:6	BASICS OF COLOURANTS	6hours

Chromatic and achromatic colors. Red shift, blue shift, hyperchromic effect, solvatochromism, halochromism,.Beer-Lambert's law, absorptivity, - empirical correlations between the chemical structures and their color. Chromophores, auxochromes, distribution rules, chromogens. $n \rightarrow \pi^*$, donor-acceptor molecules.

Color and constitution of simple azo dyes. Steric effects, and azo hydrazone tautomerism in azo dyes. Color and

chemical constitution of indigoid dyes. Introduction to cross - conjugated chromophores.			
Module:7	**CONTEMPORARY MATERIALS**	**5 hours**	
Ceramics: alumina, zirconia, composites: ceramic matrix, polymer, for bio and machine parts, smart materials – photochromic, color changing materials, LEDs. Materials for energy and environment: solar cells, automobile exhaust catalysts, concepts of nanotechnology applied to materials; few examples. Biodegradable and bio-compatible materials: bio-polymers and bio-implants; Fiber-reinforced 2D materials : graphene, graphite			
Module:8	**LECTURE BY INDUSTRY EXPERTS**	**2 hours**	
	Total Lecture hours:	**45 hours**	

Text Book(s)	
I	1. General Chemistry for Engineers by Jeffrey S. Gaffney and Nancy A Marley, Elsevier Publisher, 2018. 2. O.G. Palanna, McGraw Hill Education (India) Private Limited, 9th Reprint, 2015. 3. Corrosion Chemistry, Volkan Cicek and Bayan Al-Numan, Wiley Publishers, 2011 4. "Photovoltaic solar energy: From fundamentals to Applications", AngÃ¨le Reinders, Pierre Verlinden, Wilfried van Sark, Alexandre Freundlich, Wiley publishers, 2017.
Reference Books	
1.	**Reference Books** 1. O.V. Roussak and H.D. Gesser, Applied Chemistry-A Text Book for Engineers and Technologists, Springer Science Business Media, New York, 2nd Edition, 2013. 2. Chemistry for Engineering students by Lawrence S Brown and Thomas A.Holme, 3rd Edition, CENGAGE Learning, 2015
II. Mode of Evaluation: Internal Assessment (CAT I, CAT-II, Quizzes, Digital Assignments & FAT	

Recommended by Board of Studies	**09-11-2018**		
Approved by Academic Council	No. 53	Date	**Date: 13-12-2018**

Course code	Course title	L	T	P	J	C
ENG1000	Foundation English - I	0	0	4	0	0
Pre-requisite	Less than 50% EPT score	Syllabus Version				
		1				

Course Objectives:

1. To equip learners with English grammar and its application.
2. To enable learners to comprehend simple text and train them to speak and write flawlessly.
3. To familiarize learners with MTI and ways to overcome them.

Expected Course Outcome:

1. Develop the skills to communicate clearly through effective grammar, pronunciation and writing.
2. Understand everyday conversations in English
3. Communicate and respond to simple questions about oneself.
4. Improve vocabulary and expressions.
5. Prevent MTI (Mother Tongue Influence) during usual conversation.

Module:1	**Essentials of grammar**	**3 Hours**
Understand basic grammar-Parts of Speech Activity: Grammar worksheets on parts of speech		
Module:2	**Vocabulary Building**	**3 Hours**
Vocabulary development; One word substitution Activity: Elementary vocabulary exercises		
Module:3	**Applied grammar and usage**	**4 Hours**
Types of sentences; Tenses Activity: Grammar worksheets on types of sentences; tenses		
Module:4	**Rectifying common errors in everyday conversation**	**4 Hours**
Detect and rectify common mistakes in everyday conversation Activity: Common errors in prepositions, tenses, punctuation, spelling and other parts of speech; Colloquialism		
Module :5	**Jumbled sentences**	**2 Hours**
Sentence structure; Jumbled words to form sentences; Jumbled sentences to form paragraph/ short story Activity: Unscramble a paragraph / short story		
Module:6	**Text-based Analysis**	**4 Hours**
Wings of Fire -Autobiography of APJ Abdul Kalam (Excerpts) Activity: Enrich vocabulary by reading and analyzing the text		
Module:7	**Correspondence**	**3 Hours**
Letter, Email, Application Writing Activity: Compose letters; Emails, Leave applications		
Module:8	**Listening for Understanding**	**4 Hours**
Listening to simple conversations & gap fill exercises		

Activity: Simple conversations in Received Pronunciation using audio-visual materials.		
Module:9	**Speaking to Convey**	**6 Hours**
Self-introduction; role-plays; Everyday conversations Activity**:** Identify and communicate characteristic attitudes, values, and talents; Working and interacting within groups		
Module:10	**Reading for developing pronunciation**	**6 Hours**
Loud reading with focus on pronunciation by watching relevant video materials Activity: Practice pronunciation by reading aloud simple texts; Detecting syllables; Visually connecting to the words shown in relevant videos		
Module:11	**Reading to Contemplate**	**4 Hours**
Reading short stories and passages Activity: Reading and analyzing the author's point of view; Identifying the central idea.		
Module:12	**Writing to Communicate**	**6 Hours**
Paragraph Writing; Essay Writing; Short Story Writing Activity: Writing paragraphs, essays and short- stories		
Module:13	**Interpreting Graphical Data**	**6 Hours**
Describing graphical illustrations; interpreting basic charts, tables, and formats Activity: Interpreting and presenting simple graphical representations/charts in the form of PPTs		
Module:14	**Overcoming Mother Tongue Influence (MTI) in Pronunciation**	**5 Hours**
Practicing common variants in pronunciation Activity: Identifying and overcoming mother tongue influence.		
	Total Laboratory Hours	**60 Hours**

Text Book / Workbook	
1.	Wren, P.C., & Martin, H. (2018).*High School English Grammar & Composition* N.D.V. PrasadaRao (Ed.). NewDelhi: S. Chand & Company Ltd.
2.	McCarthy, M. O'Dell, F.,& Bunting, J.D. (2010).*Vocabulary in Use(High Intermediate students book with answers)*. Cambridge University Press
Reference Books	
1.	Watkins, P.(2018).*Teaching and Developing Reading Skills: Cambridge Handbooks for Language teachers*. Cambridge University Press.
2.	*Mishra, S., &Muralikrishna, C. (2014).Communication Skills for Engineers.* Pearson Education India
3	Lewis, N. (2011).*Word Power Made Easy*. Goyal Publisher
4	https:/americanliterature.com/short-short-stories
5	Tiwari, A., &Kalam, A. (1999).*Wings of Fire - An Autobiography of Abdul Kalam*. Universities Press (India) Private Limited.

Mode of Evaluation: Quizzes, Presentation, Discussion, Role Play, Assignments

List of Challenging Experiments (Indicative)		
1.	Rearranging scrambled sentences	**8 hours**

2.	Identifying errors in oral and written communication	**12 hours**
3.	Critically analyzing the text	**8 hours**
4.	Developing passages from hint words	**8 hours**
5.	Role-plays	**12 hours**
6.	Listening to a short story and analyzing it	**12 hours**
	Total Laboratory Hours	**60 hours**

Mode of Evaluation: Quizzes, Presentation, Discussion, Role Play, Assignments

Recommended by Board of Studies	08-06-2019		
Approved by Academic Council	55	Date	13-06-2019

Course code	Course title	L	T	P	J	C
ENG2000	Foundation English - II	0	0	4	0	0
Pre-requisite	51% - 70% EPT / Foundation English I	Syllabus version				
		1				

Course Objectives:

1. To practice grammar and vocabulary effectively
2. To acquire proficiency levels in LSRW skills in diverse social situations.
3. To analyze information and converse effectively in technical communication.

Expected Course Outcome:

1. Accomplish a deliberate reading and writing process with proper grammar and vocabulary.
2. Comprehend sentence structures while Listening and Reading.
3. Communicate effectively and share ideas in formal and informal situations.
4. Understand specialized articles and technical instructions and write clear technical correspondence.
5. Critically think and analyze with verbal ability.

Module:1	Grammatical Aspects	4 hours	

Sentence Pattern, Modal Verbs, Concord (SVA), Conditionals, Connectives
Activity : Worksheets, Exercises

Module:2	Vocabulary Enrichment	4 hours	

Active & Passive Vocabulary, Prefix and Suffix, High Frequency Words
Activity : Worksheets, Exercises

Module:3	Phonics in English	4 Hours	

Speech Sounds – Vowels and Consonants – Minimal Pairs- Consonant Clusters- Past Tense Marker and Plural Marker
Activity : Worksheets, Exercises

Module:4	Syntactic and Semantic Errors	2 Hours	

Tenses /SVA/Articles/ Prepositions/ Punctuation & Right Choice of Vocabulary
Activity : Worksheets, Exercises

Module:5	Stylistic errors	2 Hours	

Dangling Modifiers, Parallelism, Standard English, Ambiguity, Redundancy, Brevity
Activity : Worksheets, Exercises

Module:6	Listening and Note making	6 Hours	

Intensive and Extensive Listening - Scenes from plays of Shakespeare (Eg: Court scene in *The Merchant of Venice*, Disguise Scene in *The Twelfth Night*, Death of Desdemona in *Othello*, Death scene in *Julius Caesar* and Balcony scene from *Romeo and Juliet*)
Activity : Summarizing; Note-making and drawing inferences from Short videos

Module:7	Art of Public Speaking	6 Hours	

Impromptu, Importance of Non-verbal Communication, Technical Talks, Dynamics of Professional Presentations – Individual & Group
Activity : Ice Breaking; Extempore speech; Structured technical talk and Group presentation

Module:8	Reading Comprehension Skills	4 Hours	

Skimming, scanning, comprehensive reading, guessing words from context, understanding text organization, recognizing argument and counter-argument; distinguishing between main information and supporting detail, fact and opinion, hypothesis versus evidence; summarizing and note-taking, Critical Reasoning Questions – Reading and Discussion Activity: Reading of Newspapers Articles and Worksheets on Critical Reasoning from web resources			
Module: 9	**Creative Writing**	**4 Hours**	
Structure of an essay, Developing ideas on analytical/ abstract topics Activity: Movie Review, Essay Writing on suggested Topics, Picture Descriptions			
Module: 10	**Verbal Aptitude**	**6 hours**	
Word Analogy, Sentence Completion using Appropriate words, Sentence Correction Activity: Practicing the use of appropriate words and sentences through web tools.			
Module: 11	**Business Correspondence**	**4 hours**	
Formal Letters- Format and purpose: Business Letters - Sales and complaint letter Activity: Letter writing- request for Internship, Industrial Visit and Recommendation			
Module: 12	**Career Development**	**6 hours**	
Telephone Etiquette, Resume Preparation, Video Profile Activity: Preparation of Video Profile			
Module: 13	**Art of Technical Writing - I**	**4 hours**	
Technical Instructions, Process and Functional Description Activity: Writing Technical Instructions			
Module: 14	**Art of Technical Writing – II**	**4 hours**	
Format of a Report and Proposal Activity: Technical Report Writing, Technical Proposal			
	Total Lecture hours:	**60 hours**	

Text Book / Workbook

1.	Sanjay Kumar & Pushp Lata, *Communication Skills*, 2nd Edition, OUP, 2015
2	Wren & Martin, *High School English Grammar & Composition*, Regular ed., ND: Blackie ELT Books, 2018

Reference Books

1	Peter Watkins, *Teaching and Developing Reading Skills*: Cambridge Handbooks for Language Teachers, Cambridge, 2018
2	Aruna Koneru, *Professional Speaking Skills*, OUP, 2015.
3	J.C.Nesfield, *English Grammar English Grammar Composition and Usage,* Macmillan. 2019.
4	Richard Johnson-Sheehan, *Technical Communication Today*, 6th edition, ND: Pearson, 2017.
5	Balasubramaniam, *Textbook of English Phonetics For Indian Students* , 3rd Edition , S. Chand Publishers, 2013.

Web Resources

1. https://www.hitbullseye.com/Sentence-Correction-Practice.php 2. https://hitbullseye.com/Critical-Reasoning-Practice-Questions.php			
Mode of Evaluation: Presentation, Discussion, Role Play, Assignments , FAT			
List of Challenging Experiments (Indicative)			
1.	Reading and Analyzing Critical Reasoning questions		
2.	Listening and Interpretation of Videos		
3.	Letter to the Editor		
4.	Developing structured Technical Talk		
5.	Drafting SOP (Statement of Purpose)		
6.	Video Profile		
Mode of Evaluation: Presentation, Discussion, Role Play, Assignments , FAT			
Recommended by Board of Studies	08.06.2019		
Approved by Academic Council	55	Date	13-06-2019

Course code	Course Title	L	T	P	J	C
ENG1901	Technical English - I	0	0	4	0	2
Pre-requisite		Syllabus version				
		1				

Course Objectives:

1. To enhance students‘ knowledge of grammar and vocabulary to read and write error-free language in real life situations.
2. To make the students‘ practice the most common areas of written and spoken communications skills.
3. To improve students‘ communicative competency through listening and speaking activities in the classroom. .

Expected Course Outcome:

1. Develop a better understanding of advanced grammar rules and write grammatically correct sentences.
2. Acquire wide vocabulary and learn strategies for error-free communication.
3. Comprehend language and improve speaking skills in academic and social contexts.
4. Improve listening skills so as to understand complex business communication in a variety of global English accents through proper pronunciation.
5. Interpret texts, diagrams and improve both reading and writing skills which would help them in their academic as well as professional career

Module:1	Advanced Grammar	4 hours

Articles, Tenses, Voice and Prepositions
Activity: Worksheets on Impersonal Passive Voice, Exercises from the prescribed text

Module:2	Vocabulary Building I	4 hours

Idioms and Phrases, Homonyms, Homophones and Homographs
Activity: Jigsaw Puzzles; Vocabulary Activities through Web tools

Module:3	Listening for Specific Purposes	4 hours

Gist, monologues, short conversations, announcements, briefings and discussions
Activity: Gap filling; Interpretations

Module:4	Speaking for Expression	6 hours

Introducing oneself and others, Making Requests & responses, Inviting and Accepting/Declining Invitations
Activity: Brief introductions; Role-Play; Skit.

Module:5	Reading for Informatio	4 hours

Reading Short Passages, News Articles, Technical Papers and Short Stories
Activity: Reading specific news paper articles; blogs

Module:6	Writing Strategies	4 hours

Joining the sentences, word order, sequencing the ideas, introduction and conclusion
Activity: Short Paragraphs; Describing familiar events; story writing

Module:7	Vocabulary Building II	4 hours

Enrich the domain specific vocabulary by describing Objects, Charts, Food, Sports and Employment.

Activity: Describing Objects, Charts, Food, Sports and Employment		
Module:8	**Listening for Daily Life**	**4 hours**
Listening for statistical information, Short extracts, Radio broadcasts and TV interviews Activity: Taking notes and Summarizing		
Module:9	**Expressing Ideas and Opinions**	**6 hours**
Telephonic conversations, Interpretation of Visuals and describing products and processes. Activity: Role-Play (Telephonic); Describing Products and Processes		
Module: 10	**Comprehensive Reading**	**4 hours**
Reading Comprehension, Making inferences, Reading Graphics, Note-making, and Critical Reading. Activity: Sentence Completion; Cloze Tests		
Module: 11	**Narration** **Narration**	4 hours **4 hours**
Writing narrative short story, Personal milestones, official letters and E-mails. Activity: Writing an E-mail; Improving vocabulary and writing skills.		
Module :12	**Pronunciation**	**4 hours**
Speech Sounds, Word Stress, Intonation, Various accents Activity: Practicing Pronunciation through web tools; Listening to various accents of English		
Module :13	**Editing**	**4 hours**
Simple, Complex & Compound Sentences, Direct & Indirect Speech, Correction of Errors, Punctuations. Activity: Practicing Grammar		
Module:14	**Short Story Analysis**	**4 hours**
"The Boundary " by Jhumpa Lahiri Activity: Reading and analyzing the theme of the short story.		
	Total Lecture hours	**60 hours**

Text Book(s)

1.	Wren, P.C.; Martin, H.; Prasada Rao, N.D.V. (1973–2010). *High School English Grammar & Composition*. New Delhi: Sultan Chand Publishers.
2.	Kumar, Sanjay,; Pushp Latha. (2018) English Language and Communication Skills for Engineers, India: Oxford University Press.

Reference Books

1.	Guptha S C, (2012) *Practical English Grammar & Composition*, 1st Edition, India: Arihant Publishers
2.	Steven Brown, (2011) Dorolyn Smith**,** *Active Listening* ***3,*** 3rd Edition, UK: Cambridge University Press.
3.	Liz Hamp-Lyons, Ben Heasley, (2010) *Study Writing*, 2nd Edition, UK: Cambridge University Press.
4.	Kenneth Anderson, Joan Maclean, (2013) Tony Lynch, *Study Speaking*, 2nd Edition, UK: Cambridge, University Press.
5.	Eric H. Glendinning, Beverly Holmstrom, (2012) *Study Reading*, 2nd Edition, UK: Cambridge University Press.
6.	Michael Swan, (2017) *Practical English Usage* (Practical English Usage), 4th edition, UK:

	Oxford University Press.
7.	Michael McCarthy, Felicity O'Dell, (2015) *English Vocabulary in Use Advanced* (South Asian Edition), UK: Cambridge University Press.
8.	Michael Swan, Catherine Walter, (2012) *Oxford English Grammar Course Advanced*, Feb, 4th Edition, UK: Oxford University Press.
9.	Watkins, Peter. (2018) *Teaching and Developing Reading Skills: Cambridge Handbooks for Language teachers*, UK: Cambridge University Press.
10.	(*The Boundary by Jhumpa Lahiri)* URL: https://www.newyorker.com/magazine/2018/01/29/the-boundary?intcid=inline_amp

Mode of assessment: Quizzes, Presentation, Discussion, Role play, Assignments and FAT

List of Challenging Experiments (Indicative)		
1.	Self-Introduction	**12 hours**
2.	Sequencing Ideas and Writing a Paragraph	**12 hours**
3.	Reading and Analyzing Technical Articles	**8 hours**
4	Listening for Specificity in Interviews (Content Specific)	**12 hours**
5.	Identifying Errors in a Sentence or Paragraph	**8 hours**
6.	Writing an E-mail by narrating life events	**8 hours**
Total Laboratory Hours		**60 hours**

Recommended by Board of Studies	08-06-2019		
Approved by Academic Council	No. 55	Date	13-06-2019

Course Code	Course Title	L	T	P	J	C
ENG 1902	Technical English - II	0	0	4	0	2
Pre-requisite	71% to 90% EPT score	Syllabus Version				
		1				

Course Objectives:

1. To acquire proficiency levels in LSRW skills on par with the requirements for placement interviews of high-end companies / competitive exams.
2. To evaluate complex arguments and to articulate their own positions on a range of technical and general topics.
3. To speak in grammatical and acceptable English with minimal MTI, as well as develop a vast and active vocabulary.

Expected Course Outcome:

1. Communicate proficiently in high-end interviews and exam situations and all social situations
2. Comprehend academic articles and draw inferences
3. Evaluate different perspectives on a topic
4. Write clearly and convincingly in academic as well as general contexts
5. Synthesize complex concepts and present them in speech and writing

Module:1	Listening for Clear Pronunciation	4 hours

Ice-breaking, Introduction to vowels, consonants, diphthongs.
Listening to formal conversations in British and American accents (BBC and CNN) as well as other 'native' accents
Activity: Factual and interpretive exercises; note-making in a variety of global English accents

Module:2	Introducing Oneself	4 hours

Speaking: Individual Presentations
Activity: Self-Introductions, Extempore speech

Module:3	Effective Writing	6 hours

Writing: Business letters and Emails, Minutes and Memos
Structure/ template of common business letters and emails: inquiry/ complaint/ placing an order; Formats of Minutes and Memos
Activity: Students write a business letter and Minutes/ Memo

Module:4	Comprehensive Reading	4 hours

Reading: Reading Comprehension Passages, Sentence Completion (Technical and General Interest), Vocabulary and Word Analogy
Activities: Cloze tests, Logical reasoning, Advanced grammar exercises

Module:5	Listening to Narratives	4 hours

Listening: Listening to audio files of short stories, News, TV Clips/ Documentaries, Motivational Speeches in UK/ US/ global English accents.
Activity: Note-making and Interpretive exercises

Module:6	Academic Writing and Editing	6 hours

Writing: Editing/ Proofreading symbols
Citation Formats
Structure of an Abstract and Research Paper
Activity: Writing Abstracts and research paper; Work with Editing/ Proofreading exercise

Module:7	Team Communication	4 hours

Speaking: Group Discussions and Debates on complex/ contemporary topics Discussion evaluation parameters, using logic in debates Activity: Group Discussions on general topics		
Module:8	**Career-oriented Writing**	**4 hours**
Writing: Resumes and Job Application Letters, SOP Activity: Writing resumes and SOPs		
Module:9	**Reading for Pleasure**	**4 hours**
Reading: Reading short stories Activity: Classroom discussion and note-making, critical appreciation of the short story		
Module: 10	**Creative Writing**	**4 hours**
Writing: Imaginative, narrative and descriptive prose Activity: Writing about personal experiences, unforgettable incidents, travelogues		
Module: 11	**Academic Listening**	**4 hours**
Listening: Listening in academic contexts Activity: Listening to lectures, Academic Discussions, Debates, Review Presentations, Research Talks, Project Review Meetings		
Module:12	**Reading Nature-based Narratives**	**4 hours**
Narratives on Climate Change, Nature and Environment Activity: Classroom discussions, student presentations		
Module:13	**Technical Proposals**	**4 hours**
Writing: Technical Proposals Activities: Writing a technical proposal		
Module:14	**Presentation Skills**	**4 hours**
Persuasive and Content-Specific Presentations Activity: Technical Presentations		
	Total Lecture hours:	**60 hours**

Text Book / Workbook	
1.	Oxenden, Clive and Christina Latham-Koenig. *New English File: Advanced Students Book*. Paperback. Oxford University Press, UK, 2017.
2	Rizvi, Ashraf. *Effective Technical Communication*. McGraw-Hill India, 2017.

Reference Books	
1.	Oxenden, Clive and Christina Latham-Koenig, *New English File: Advanced: Teacher's Book with Test and Assessment*. CD-ROM: Six-level General English Course for Adults. Paperback. Oxford University Press, UK, 2013.
2.	Balasubramanian, T. *English Phonetics for the Indian Students: A Workbook*. Laxmi Publications, 2016.
3.	Philip Seargeant and Bill Greenwell, *From Language to Creative Writing*. Bloomsbury Academic, 2013.
4.	Krishnaswamy, N. *Eco-English*. Bloomsbury India, 2015.
5.	Manto, Saadat Hasan. *Selected Short Stories*. Trans. Aatish Taseer. Random House India, 2012.
6.	Ghosh, Amitav. *The Hungry Tide*. Harper Collins, 2016.
7.	Ghosh, Amitav. *The Great Derangement: Climate Change and the Unthinkable*. Penguin Books, 2016.
8.	*The MLA Handbook for Writers of Research Papers*, 8th ed. 2016.
	Online Sources: https://americanliterature.com/short-short-stories. (75 *short* short stories) http://www.eco-ction.org/dt/thinking.html (Leopold, Aldo."Thinking like a Mountain") /www.esl-lab.com/;

	www.bbc.co.uk/learningenglish/; /www.bbc.com/news; /learningenglish.voanews.com/a/using-voa-learning-english-to-improve-listening-skills/3815547.html

Mode of evaluation: Quizzes, Presentation, Discussion, Role play, Assignments and FAT

List of Challenging Experiments (Indicative)		
1.	Self-Introduction using SWOT	**12 hours**
2.	Writing minutes of meetings	**10 hours**
3.	Writing an abstract	**10 hours**
4.	Listening to motivational speeches and interpretation	**10 hours**
5.	Cloze Test	**6 hours**
6.	Writing a proposal	**12 hours**
	Total Laboratory Hours	**60 hours**

Mode of evaluation: Quizzes, Presentation, Discussion, Role play, Assignments and FAT

Recommended by Board of Studies	08.06.2019	
Approved by Academic Council	55	Date: 13-06-2019

Course code	Course Title	L	T	P	J	C
ENG1903	Advanced Technical English	0	0	2	4	2
Pre-requisite	Greater than 90 % EPT score	Syllabus version				
		1				

Course Objectives:

1. To review literature in any form or any technical article
2. To infer content in social media and respond accordingly
3. To communicate with people across the globe overcoming trans-cultural barriers and negotiate successfully

Expected Course Outcome:

1. Analyze critically and write good reviews
2. Articulate research papers, project proposals and reports
3. Communicate effectively in a trans-cultural environment
4. Negotiate and lead teams towards success
5. Present ideas in an effective manner using web tools

Module:1	Negotiation and Decision Making Skills through Literary Analysis	5 hours

Concepts of Negotiation and Decision Making Skills
Activity: Analysis of excerpts from Shakespeare‘s ―The Merchant of Venice‖ (court scene) and discussion on negotiation skills.
Critical evaluation of excerpts from Shakespeare‘s ―Hamlet‖(Monologue by Hamlet) and discussion on decision making skills

Module:2	Writing reviews and abstracts through movie interpretations	5 hours

Review writing and abstract writing with competency
Activity: Watching Charles Dickens ―Great Expectations‖ and writing a movie review
Watching William F. Nolan‘s ―Logan‘s Run‖ and analyzing it in tune with the present scenario of depletion of resources and writing an abstract

Module:3	Technical Writing	4 hours

Stimulate effective linguistics for writing: content and style
Activity: Proofreading Statement of Purpose

Module:4	Trans-Cultural Communication	4 hours

Nuances of Trans-cultural communication
Activity: Group discussion and case studies on trans-cultural communication.
Debate on trans-cultural communication.

Module:5	Report Writing and Content Writing	4 hours

Enhancing reportage on relevant audio-visuals
Activity: Watch a documentary on social issues and draft a report
Identify a video on any social issue and interpret

Module:6	Drafting project proposals and article writing	4 hours

Dynamics of drafting project proposals and research articles

Activity: Writing a project proposal.		
Module:7	**Technical Presentations**	**4 hours**
Build smart presentation skills and strategies Activity: Technical presentations using PPT and Web tools		
	Total Lecture hours	**30 hours**

Text Book(s)

1.	Raman, Meenakshi & Sangeeta Sharma. *Technical Communication: Principles and Practice*, 3rd edition, Oxford University Press, 2015.

Reference Books

1.	Basu B.N. *Technical Writing*, 2011 Kindle edition
2.	Arathoon, Anita. *Shakespeare's The Merchant of Venice* (Text with Paraphrase), Evergreen Publishers, 2015.
3.	Kumar, Sanjay and Pushp Lata. *English Language and Communication Skills for Engineers*, Oxford University Press, India, 2018.
4.	Frantisek, Burda. *On Transcultural Communication*, 2015, LAP Lambert Academic Publishing, UK.
5.	Geever, C. Jane. *The Foundation Center's Guide to Proposal Writing*, 5th Edition, 2007, Reprint 2012 The Foundation Center, USA.
6.	Young, Milena. *Hacking Your Statement of Purpose: A Concise Guide to Writing Your SOP*, 2014 Kindle Edition.
7.	C Muralikrishna & Sunitha Mishra, *Communication Skills for Engineers*, 2nd edition, NY: Pearson, 2011.
8.	Ray, Ratri, *William Shakespeare's Hamlet*, The Atlantic Publishers, 2011.

Mode of assessment: Quizzes, Presentation, Discussion, Role play, Assignments and FAT

List of Challenging Experiments (Indicative)		
1.	Enacting a court scene - Speaking	**6 hours**
2.	Watching a movie and writing a review	**4 hours**
3.	Trans-cultural – case studies	**2 hours**
4	Drafting a report on any social issue	**6 hours**
5.	Technical Presentation using web tools	**6 hours**
6.	Writing a research paper	**6 hours**
J- Component Sample Projects		
1.	Short Films	

2.	Field Visits and Reporting			
3.	Case studies			
4	Writing blogs			
5.	Vlogging			
Total Hours (J – Components)		**60 hours**		
Mode of evaluation: Quizzes, Presentation, Discussion, Role play, Assignments and FAT				
Recommended by Board of Studies		08-06-2019		
Approved by Academic Council		No. 55	Date	13-06-2019

FRE1001	FRANÇAIS QUOTIDIEN	L	T	P	J	C
		2	0	0	0	2
Pre-requisite	NIL	Syllabus version				
		1.0				

Course Objectives:

The course gives students the necessary background to:

1. Learn the basics of French language and to communicate effectively in French in their day to day life.
2. Achieve functional proficiency in listening, speaking, reading and writing
3. Recognize culture-specific perspectives and values embedded in French language.

Expected Course Outcome:

The students will be able to :

1. **Identify in French language the daily life communicative situations via personal pronouns, emphatic pronouns, salutations, negations and interrogations.**
2. Communicate effectively in French language via regular / irregular verbs.
3. Demonstrate comprehension of the spoken / written language in translating simple sentences.
4. Understand and demonstrate the comprehension of some particular new range of unseen written materials
5. Demonstrate a clear understanding of the French culture through the language studied

Module: 1	Expressions simples	3 hours

Les Salutations, Les nombres (1-100), Les jours de la semaine, Les mois de l'année, Les Pronoms Sujets, Les Pronoms Toniques, La conjugaison des verbes irréguliers- avoir / être / aller / venir / faire etc.

Savoir-faire pour:Saluer, Se présenter, Présenter quelqu'un, Etablir des contacts

Module: 2	La conjugaison des verbes réguliers	3 hours

La conjugaison des verbes réguliers, La conjugaison des verbes pronominaux, La Négation, L'interrogation avec 'Est-ce que ou sans Est-ce que'.

Savoir-faire pour:

Chercher un(e) correspondant(e), Demander des nouvelles d'une personne.

Module: 3	La Nationalité du Pays, L'article (défini/ indéfini), Les prépositions	6 hours

La Nationalité du Pays, L'article (défini/ indéfini), Les prépositions (à/en/au/aux/sur/dans/avec etc.), L'article contracté, Les heures en français, L'adjectif (La Couleur, L'adjectif possessif, L'adjectif démonstratif/ L'adjectif interrogatif (quel/quelles/quelle/quelles), L'accord des adjectifs avec le nom, L'interrogation avec Comment/ Combien / Où etc.

Savoir-faire pour:

Poser des questions, Dire la date et les heures en français,

Module: 4	La traduction simple	4 hours

La traduction simple :(français-anglais / anglais –français),

Savoir-faire pour :

Faire des achats, Comprendre un texte court, Demander et indiquer le chemin.

Module: 5	L'article Partitif, Mettez les phrases aux pluriels	5 hours

L'article Partitif, Mettez les phrases aux pluriels, Faites une phrase avec les mots donnés, Trouvez les questions.

Savoir-faire pour :

Répondez aux questions générales en français, Exprimez les phrases données au Masculin ou au Féminin, Associez les phrases.

Module: 6	Décrivez :	3 hours

Décrivez: La Famille / La Maison / L'université / Les Loisirs / La Vie quotidienne etc.				
Module: 7	Dialogue			**4 hours**
Dialogue: 1. Décrire une personne. 2. Des conversations à la cafeteria. 3. Des conversations avec les membres de la famille 4. Des dialogues entre les amis.				
Module: 8	**Guest lecures**			**2 hours**
Guest lectures / Natives speakers				
Total Lecture hours				**30 hours**
Text Book(s)				
1.	Fréquence jeunes-1, Méthode de français, G. Capelle et N.Gidon, Hachette, Paris, 2010.			
2.	Fréquence jeunes-1, Cahier d'exercices, G. Capelle et N.Gidon, Hachette, Paris, 2010.			
Reference Books				
1.	CONNEXIONS 1, Méthode de français, Régine Mérieux, Yves Loiseau,Les Éditions Didier, 2010.			
2.	CONNEXIONS 1, Le cahier d'exercices, Régine Mérieux, Yves Loiseau, Les Éditions Didier, 2010			
3.	ALTER EGO 1, Méthode de français, Annie Berthet, Catherine Hugo, Véronique M. Kizirian, Béatrix Sampsonis, Monique Waendendries, Hachette livre Paris 2011			
4.	ALTER EGO 1, Le cahier d'activités, Annie Berthet, Catherine Hugo, Béatrix Sampsonis, Monique Waendendries, Hachette livre, Paris 2011			
Mode of Evaluation: CAT / Assignment / Quiz / Seminar / FAT				
Recommended by Board of Studies	26.02.2016			
Approved by Academic Council	41st ACM	**Date**	17.06.2016	

GER1001	GRUNDSTUFE DEUTSCH	L	T	P	J	C
		2	0	0	0	2
Pre-requisite	Nil	Syllabus version				
		1.0				

Course Objectives:

The course gives students the necessary background to:

1. Demonstrate Proficiency in reading, writing, and speaking in basic German. Learning vocabulary related to profession, education centres, day-to-day activities, food, culture, sports and hobby, family set up, workplace, market and classroom activities are essential.
2. Make the students industry oriented and make them adapt in the German culture.

Expected Course Outcome:

The students will be able to

1. Remember greeting people, introducing oneself and understanding basic expressions in German.
2. Understand basic grammar skills to use these in a meaning way.
3. Remember beginner's level vocabulary
4. Create sentences in German on a variety of topics with significant precision and in detail.
5. Apply good comprehension of written discourse in areas of special interests.

Module: 1		**3 hours**

Begrüssung, Landeskunde, Alphabet, Personalpronomen, Verben- heissen, kommen, wohnen, lernen, Zahlen (1-100), W-Fragen, Aussagesätze, Nomen- Singular und Plural, der Artikel -Bestimmter- Unbestimmter Artikel)

Lernziel :

Sich vorstellen, Grundlegendes Verständnis von Deutsch, Deutschland in Europa

Module: 2		**3 hours**

Konjugation der Verben (regelmässig /unregelmässig),das Jahr- Monate, Jahreszeiten und die Woche, Hobbys, Berufe, Artikel, Zahlen (Hundert bis eine Million), Ja-/Nein- Frage, Imperativ mit ,,Sie'' Lernziel:

Sätze schreiben, über Hobbys, Berufe erzählen, usw

Module: 3		**5 hours**

Possessivpronomen, Negation, Kasus (Bestimmter- Unbestimmter Artikel) Trennbareverben, Modalverben, Uhrzeit, Präpositionen, Lebensmittel, Getränkeund Essen, Farben, Tiere

Lernziel :

Sätze mit Modalverben, Verwendung von Artikel, Adjektiv beim Verb

Module: 4		**5 hours**

Übersetzung: (Deutsch – Englisch / Englisch – Deutsch)

Lernziel :

Die Übung von Grammatik und Wortschatz

Module: 5		**5 hours**

Leserverständnis. Mindmap machen, Korrespondenz- Briefe und Email

Lernziel:

Übung der Sprache, Wortschatzbildung

Module: 6		**3 hours**

Aufsätze : Die Familie, Bundesländer in Deutschland, Ein Fest in Deutschland,

Lernziel :

Aktiver, selbständiger Gebrauch der Sprache

Module: 7		**4 hours**

Dialoge: a) Gespräche mit einem/einer Freund /Freundin. b) Gespräche beim Einkaufen ; in einem Supermarkt ; in einer Buchhandlung ; c) in einem Hotel - an der Rezeption ; ein Termin beim Arzt. d) Ein Telefongespräch ; Einladung–Abendessen		
Module: 8		**2 hours**
Guest Lectures / Native Speakers Einleitung in die deustche Kultur und Politik		
Total Lecture hours		**30 hours**
Text Book(s)		
1.	Netzwerk Deutsch als Fremdsprache A1, Stefanie Dengler, Paul Rusch, Helen Schmtiz, Tanja Sieber, Klett-Langenscheidt Verlag, München : 2013	
Reference Books		
1.	Lagune, Hartmut Aufderstrasse, Jutta Müller, Thomas Storz, 2012.	
2.	Deutsche Sprachlehre für Ausländer, Heinz Griesbach, Dora Schulz, 2013	
3.	Studio d A1, Hermann Funk, Christina Kuhn, CorneslenVerlag, Berlin: 2010	
4.	Tangram Aktuell-I, Maria-Rosa, SchoenherrTil, Max Hueber Verlag, Muenchen: 2012	
	www.goethe.de wirtschaftsdeutsch.de hueber.de klett-sprachen.de www.deutschtraning.org	
Mode of Evaluation: CAT / Assignment / Quiz / Seminar / FAT		
Recommended by Board of Studies	04.03.2016	
Approved by Academic Council	41st ACM	**Date** 17.06.2016

HUM1021	ETHICS AND VALUES	L	T	P	J	C
		2	0	0	0	2
Pre-requisite	Nil	Syllabus version				
		1.2				

Course Objectives:

1. To understand and appreciate the ethical issues faced by an individual in profession, society and polity
2. To understand the negative health impacts of certain unhealthy behaviors
3. To appreciate the need and importance of physical, emotional health and social health

Expected Course Outcome:

Students will be able to:

1. Follow sound morals and ethical values scrupulously to prove as good citizens
2. Understand varioussocial problems and learn to act ethically
3. Understand the concept of addiction and how it will affect the physical and mental health
4. Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
5. Identify the main typologies, characteristics, activities, actors and forms of cybercrime

Module: 1	Being good and responsible	5 hours

Gandhian values such as truth and non-violence – comparative analysis on leaders of past and present – society's interests versus self-interests–Personal Social Responsibility: Helping the needy, charity and serving the society.

Module: 2	Social Issues 1	4 hours

Harassment – types - Prevention of harassment, violence and terrorism

Module: 3	Social Issues 2	4 hours

Corruption: ethical values, causes, impact, laws, prevention – electoral malpractices white collar crimes – tax evasions – unfair trade practices

Module: 4	Addiction and Health	3 hours

Peer pressure - Alcoholism: ethical values, causes, impact, laws, prevention – Ill effects of smoking – Prevention of Suicides

Sexual Health: Prevention and impact of pre-marital pregnancy and Sexually Transmitted Diseases

Module: 5	Drug Abuse	4 hours

Abuse of different types of legal and illegal drugs: ethical values, causes, impact, laws and prevention

Module: 6	Personal and Professional Ethics	3 hours

Dishonesty - Stealing - Malpractices in Examinations – Plagiarism

Module: 7	Abuse of technologies	4 hours

Hacking and other cyber crimes, addiction to mobile phone usage, video games and social networking websites

Module: 8	**Invited Talk:** Contemporary Issues	3 hours
	Total Lecture hours	30 hours

Reference Books

1. Dhaliwal, K.K (2016), "Gandhian Philosophy of Ethics: A Study of Relationship between his Presupposition and Precepts, Writers Choice, New Delhi, India

2.	Vittal, N (2012), "Ending Corruption? - How to Clean up India?", Penguin Publishers, UK		
3.	Pagliaro, L.A. and Pagliaro, A.M (2012), "Handbook of Child and Adolescent Drug and Substance Abuse: Pharmacological , Developmental and Clinical Considerations", Wiley Publishers, U.S.A		
4.	Pandey, P. K (2012), "Sexual Harassment and Law in India", Lambert Publishers, Germany		
Mode of Evaluation: CAT, Assignment, Quiz, FAT and Seminar			
Recommended by Board of Studies	26.07.2017		
Approved by Academic Council	46th ACM	**Date**	24.08.2017

MGT1022	LEAN START-UP MANAGEMENT	L	T	P	J	C
		1	0	0	4	2
Pre-requisite	Nil	Syllabus version				
		1.0				

Course Objectives:

To develop the ability to

1. Learn methods of company formation and management.
2. Gain practical skills in and experience of stating of business using pre-set collection of business ideas.
3. Learn basics of entrepreneurial skills.

Expected Course Outcome:

On completion of this course the students will be able to:

1. Understand developing business models and growth drivers
2. Use the business model canvas to map out key components of enterprise
3. Analyze market size, cost structure, revenue streams, and value chain
4. Understand build-measure-learn principles
5. Foreseeing and quantifying business and financial risks

Module: 1		**2hours**
Creativity and Design Thinking (identify the vertical for business opportunity, understand your customers, accurately assess market opportunity)		
Module: 2		**3 hours**
Minimum Viable Product (Value Proposition, Customer Segments, Build-measure-learn process)		
Module: 3		**3hours**
Business Model Development (Channels and Partners, Revenue Model and streams, Key Resources, Activities and Costs, Customer Relationships and Customer Development Processes, Business model canvas–the lean model-templates)		
Module: 4		**3 hours**
Business Plan and Access to Funding (visioning your venture, taking the product / service to market, Market plan including Digital & Viral Marketing, start-up finance – Costs / Profits & Losses / cash flow, Angel / VC / Bank Loans and Key elements of raising money)		
Module: 5		**2hours**
Legal, Regulatory, CSR, Standards,Taxes		
Module: 6		**2 hours**
Lectures by Entrepreneurs		
Total Lecture hours		**15 hours**

Text Book (s)

1.	Steve Blank, K & S Ranch (2012)The Startup Owner's Manual: The Step-By-Step Guide for Building a Great Company, 1st edition
2.	Steve Blank (2013) The Four Steps to the Epiphany, K&S Ranch; 2nd edition
3.	Eric Ries (2011) The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses, Crown Business

Reference Books

1.	Holding a Cat by the Tail, Steve Blank, K & S Ranch Publishing LLC (August 14, 2014)

2.	Product Design and Development, Karal TUlrich, SDEppinger, McGrawHill
3.	Zero to One: Notes on Startups, or How to Build the Future, Peter Thiel, Crown Business (2014)
4.	Lean Analytics: Use Data to Build a Better Startup Faster (Lean Series), Alistair Croll & Benjamin Yoskovitz, O' Reilly Media; 1st Edition (March 21, 2013)
5.	Inspired: How to create Products Customers Love, Marty Cagan,S VPG Press; 1st edition (June18, 2008)
6.	**Website References:** 1. http://theleanstartup.com/ 2. https://www.kickstarter.com/projects/881308232/only-on-kickstarter-the-leaders-guide-by-eric-ries 3. http://businessmodelgeneration.com/ 4. https://www.leanstartupmachine.com/ 5. https://www.youtube.com/watch?v=fEvKo90qBns 6. http://thenextweb.com/entrepreneur/2015/07/05/whats-wrong-with-the-lean-startup-methodology/#gref 7. http://www.businessinsider.in/Whats-Lean-about-Lean-Startup/articleshow/53615661.cms 8. https://steveblank.com/tools-and-blogs-for-entrepreneurs/ 9. https://hbr.org/2013/05/why-the-lean-start-up-changes-everything 10. chventures.blogspot.in/platformsandnetworks.blogspot.in/p/saas-model.html

Teaching Modes: Assignments; Field Trips, Case Studies; e-learning; Learning through research, TED Talks				
Project				
1.	Project	60 hours		
Total Project		**60 hours**		
Recommended by Board of Studies		08.06.2015		
Approved by Academic Council		37th ACM	**Date**	16.06.2015

Course code	DESIGN WORKSHOP	L	T	P	J	C
MEE1025		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.00				

Course Objectives:

The students will be able to,

1. Understanding the representation principles and applying to various projects to familiarize with the basic manufacturing processes.
2. Learn to use the relevant tools and equipment for Product design and development.
3. Acquire competence to use hand tools and machines tools.

Expected Course Outcome:

The students will have,

1. Skills to operate hand tools and machines tools for model-making.
2. Knowledge about different types of joineries in metal and wood.
3. Ability to master different decorative techniques.

Module:1		6 hours
Introduction to types of tools and safe handling of hand and power tools.		
Module:2		8 hours
Orientation for operating different types of machines such as Shaper, Planner, Grinder, Sander, Fly press, Jig saw, Saw machine, Drilling, Lathe, Milling, and Laser cutting.		
Module:3		8 hours
Hands on practice using Shaper, Planner machine, and Drilling machine.		
Module:4		8 hours
Hands on practice using Grinding machine and Jig-saw machine.		
Module:5		6 hours
Hands on practice using soft materials for model making.		
Module:6		10 hours
Hands on practice using hard materials for model making.		
Module:7		10 hours
Hands on practice in decorative techniques.		
Module:8	Contemporary issues:	4 hours
Contemporary discussion with professional model-makers.		
	Total Lab hours:	60 hours

Text Book(s)

The Workshop Book: How to design and lead successful workshops - Pamela Hamilton 2016

Reference Books	
	1. Engineering Work shop practice for JNTU/V. Ramesh Babu/VRB Publishers Pvt. Ltd. 2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers 3. Engineering Practices Lab Manual/Jeyapoovan, SaravanaPandian/Vikas publishers 4. Dictionary of Mechanical Engineering/GHF Nayler/Jaico Publishing House. 5. Machine Design Paperback – 3 Jul 2005 - R.S. Khurmi (Author) 6. Theory of Machines Paperback – 1 Aug 2005 - by R.S. Khurmi (Author)
Mode of Evaluation: Assignment / FAT / Project	

Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	Summer Project on Social Concern	L	T	P	J	C
BDE1032		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1				

Course Objectives:

- Understanding the fundamentals of part modelling
- Understanding various aspects of product component generation
- Ability to manipulate a 2D drawing to a high-Fidelity model.

Expected Course Outcome:

The students will have,

1. Ability generate parts using modelling techniques
2. Ability to create Reverse engineering of a given component
3. Ability to make Assembly and 2d drawings of the models
4. Understanding to make draft for mould manufacturing
5. Ability to make high fidelity model
6. Ability to use rapid manufacturing techniques to create prototype

Mode of Evaluation: Internship Report, Presentation and Project Review

Recommended by Board of Studies	03-03-2018		
Approved by Academic Council	No. 49	Date	15-03-2018

Course code	**Industrial Internship** (Summer)	L	T	P	J	C
BDE3099		0	0	0	0	3
Pre-requisite	Completion of minimum of Two semesters	Syllabus version				
		v. 1.0				

Course Objectives:

The course is designed so as to expose the students to industry environment and to take up on-site assignment as trainees or interns.

Expected Course Outcome:

At the end of this internship the student should be able to:

1. Have an exposure to industrial practices and to work in teams.
2. Communicate effectively.
3. Understand the impact of design solutions in a global, economic, environmental and societal context.
4. Develop the ability to engage in research and to involve in life-long learning.
5. Comprehend contemporary issues.
6. Engage in establishing his/her digital footprint.

Contents	**8 Weeks**
Eight weeks of work at industry physically/remotely, and supervised by an expert of that industry.	

Mode of Evaluation: Internship Report, Presentation and Project Review

Recommended by Board of Studies	24-09-2020		
Approved by Academic Council	59	Date	24-09-2020

Course code	CAPSTONE PROJECT	L	T	P	J	C
BDE4099		0	0	0	0	20
Pre-requisite	As per the academic regulations	Syllabus version				
		v. 1.0				

Course Objectives:

1. To provide a definite context, to apply the leanings from various courses of the program and solve unstructured and ill-defined problems
2. To develop an integrated approach for problem solving
3. To provide an exposure to take up a real-life research problem / product development / industrial problem and arrive at meaningful conclusions / product design / solution.

Expected Course Outcome:

Upon successful completion of the course the students will be able to,

1. Formulate specific problem statements for ill-defined real life problems with reasonable assumptions and constraints.
2. Perform literature search and / or patent search in the area of interest.
3. Develop a suitable solution methodology for the problem.
4. Conduct experiments / Design & Analysis / solution iterations and document the results.
5. Perform error analysis / benchmarking / costing.
6. Synthesis the results and arrive at scientific conclusions / products / solution.
7. Document the results in the form of technical report / presentation.

Topics

Capstone Project may be a modeling & simulation, experimentation & analysis, prototype design, fabrication of new equipment, software development, etc. or a combination of these.
Capstone Project will be for one semester as per the academic regulations.

Criteria

1. Can be individual work or a group project, with a maximum of 3 students.
2. In case of group projects, the individual project report of each student should specify the individual's contribution to the group project.
3. Carried out inside or outside the university, in any relevant industry or research institution.
4. Publications in the peer reviewed journals / International Conferences will be an added advantage.
5. Plagiarism checking by Turnitin is compulsory part of UG Project Report. Plagiarism level should not exceed more than 13%.

Mode of Evaluation: Mid reviews, Final Viva-Voce, Thesis and Poster Submission

Recommended by Board of Studies	24-09-2020		
Approved by Academic Council	59	Date	24-09-2020

PROGRAM CORE COURSES

Course code	Design Fundamentals - 2D	L	T	P	J	C
BDE1001		0	0	4	4	3
Pre-requisite		Syllabus version				
		1.0				

Course Objectives:

- Understanding the fundamentals of 2-dimensional design.
- Understanding the elements of design for 2-dimension.
- Obtain a knowledge and ability to use the appropriate tools to design and develop new compositions.

Expected Course Outcome:

The students will have,

1. Ability to generate two dimensional rhythms, deformations and patterns in design.

2. Understanding in cognitive, morphological process inherent in applying shape analogies for generating two-dimensional design concepts.

3. Design a composition of low complexity and with relatively simple geometry.

4. Carry out semantic analysis of visual elements.

Module:1		6 hours

Understanding the various elements and principles of art and design in 2D.

Module:2		8 hours

Expressions and explorations using points, lines, planes and volumes and its relation in context to nature and environment.

Module:3		8 hours

Expressions and explorations using points, lines, planes and volumes and its relation in context to nature and environment.

Module:4		8 hours

Study and understanding of frame of reference or point of views.

Module:5		6 hours

Principles of colour theory and explorations.

Module:6		10 hours

Visual relationships – Balance, proportion, order, symmetry, rhythm, etc.,			
Module:7		10 hours	
Visual principles of composition: Grids, layouts, symmetry, balance and asymmetry.			
Module:8	**Contemporary issues:**	8 hours	
Contemporary discussion with the artists and designers.			
	Total Lecture hours:	60 hours	

Text Book(s)	
1.	Greet Hannah, Elements of Design, Princeton Architectural Press, 2002. Lauer, David; Design Basics, Wadsworth Publishing, 1999 L. Hotzschue; Understanding Colour, VNR, 1995
Reference Books	
1.	W. Wong; Principles Of Two Dimensional Design, John Wiley And Sons, 1972
2.	J. Bowers; Introduction To Two---Dimensional Design: Understanding Form And function, John Wiley & Sons, 1999
Mode of Evaluation: Assignment / FAT / Project / Seminar	
Mode of assessment:	

Recommended by Board of Studies	03-03-2018		
Approved by Academic Council	No. 49	Date	15-03-2018

Course code	IMAGE REPRESENTATION TECHNIQUES	L	T	P	J	C
BDE1002		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.20				

Course Objectives:

1. To acquaint students with basics of Image representation.

2. Obtain a knowledge on various perspectives on sketches through various representation techniques.

3. Obtain a knowledge and ability to use the appropriate construction techniques to design.

Expected Course Outcome:

Students will have,

1. Represent objects through constructive methodologies.
2. Represent objects in nature..
3. Construct human figure and manikin movement.
4. Represent objects/products in various perspectives.
5. Represent objects using light and shadow techniques.
6. Ability to represent objects by grid

Module:1		**6 hours**
Object Representation		
Module:2		**8 hours**
Representing nature		
Module:3		**8 hours**
Figure drawing		
Module:4		**8 hours**
One point, Two point, and Three point Perspective		
Module:5		**6 hours**
Studies in light and shadow on 3-dimensional Form Representations		
Module:6		**10 hours**
Grid based drawing, Analytical Representation		
Module:7		**10 hours**
Exposure and demonstration of Illustration and Image making software		
Module:8	**Contemporary issues:**	**4 hours**
Contemporary discussion with the artists and designers.		
	Total Lecture hours:	**60 hours**

Text Book(s)

1.	Edwards, Betty; New Drawing on the Right Side of the Brain, Publisher: Tarcher; 2002

Reference Books

1.	Dalley Terence ed.; The complete guide to illustration & design, Phaidon, Oxford, 1980
2.	T. C. Wang; Pencil Sketching, John Wiley & Sons,1997
3.	Pogany, Willy ; The Art of Drawing, Publisher: Madison Books, 1996
4.	R. Kasprin; Design Media – Techniques for water colour, pen and ink, pastel and coloured markers, John Wiley & Sons,1999

Mode of Evaluation: Assignment / FAT / Project / Seminar			
Recommended by Board of Studies	03-03-2018		
Approved by Academic Council	No. 49	Date	15-03-2018

Course code	DESIGN STUDIO – PROBLEM IDENTIFICATION	L	T	P	J	C
BDE1003		0	0	4	4	3
Pre-requisite		Syllabus version				
		1				

Course Objectives:

1. Understanding user centric design.
2. Understanding process of design.
3. Obtain knowledge and ability to identify problems faced by the user.

Expected Course Outcome:

The students will have,

1. Ability to keenly observe the design ecosystem.
2. Understanding the cognitive load of the user.
3. Knowledge on documenting the observations using different mediums.
4. Ability to identify design problems.

Module:1		**6 hours**
Introduction to Design and its ecosystem.		
Module:2		**8 hours**
Introduction to the process of design		
Module:3		**8 hours**
Inquiry and observations.		
Module:4		**8 hours**
Documenting the activities.		
Module:5		**6 hours**
Documenting the environments		
Module:6		**10hours**
Problem identification or need finding.		
Module:7		**10 hours**
Redesign of a simple problem that involves both communication and product design issues.		
Module:8	**Contemporary issues:**	**4 hours**
Contemporary discussion with the artists and designers.		
	Total Lecture hours:	**60 hours**

Text Book(s)

1.	D. Norman; The Design Of Everyday things, London, The MIT Press, 1998
2.	A Forty; Objects Of Desire, Thems & Hudson 1995

3.	J. De Noblet ed., Industrial Design--- _Reflections Of a century, Thames & Hudson, 1993		
Reference Books			
1.	Julier, G.; 20th Century Design, Thames & Hudson, 1993.		
2.	Potter, Norman; What Is a Designer: Things, Places, Messages, Princeton Architectural Press, 2002		
Mode of Evaluation: Assignment / FAT / Project / Seminar			
Mode of assessment:			
Recommended by Board of Studies		03-03-2018	
Approved by Academic Council		No. 49	Date - 15-03-2018

Course code	FUNDAMENTALS OF ERGONOMICS	L	T	P	J	C
BDE1004		2	0	2	0	3
Pre-requisite		Syllabus version				
		v. 2.00				

Course Objectives:

Students will be able to,

1. Implement ergonomic principles in industrial design.
2. Understand the importance and techniques of human biological data collection and experiments.
3. Investigate towards accidents and Safety Management.

Expected Course Outcome:

The students will have,

1. Knowledge of ergonomic principles.
2. Proper understanding of human anthropometry.
3. Knowledge of the human body motions and limitations.
4. Knowledge of environment factors and performance support.
5. Ability to analyse the non-tangible human factors.
6. Good understanding of anthropometry and its importance in designing products.

Module:1	Introducing Ergonomics	4 hours

Brief history of Ergonomics and Human Factors. Perspectives and Aspects of Ergonomics. Clarification of Ergonomics -Physical/Cognitive/Organizational/Industrial/Occupational. Applications of Ergonomics. Idea of System & Man – Machine – Environment.

Module:2	Human Aspect Fundamentals	4 hours

Preliminary Anatomy – Musculoskeletal system. Body Dynamics. Basic Body Mechanics. Postures – Sitting, standing, etc., and relation to task/job. Posture and body supporting devices.

Module:3	Physical Ergonomics	4 hours

Body Dimensions – Static & Dynamic Anthropometry and Measurement techniques. Workstation – Idea and basics of Workspace Design. Task Design. Fitting the task to the human. Statistical linkage to Workstation and task design. Target population and fitting workstation and task to them. Workload – all aspects.

Module:4	Environmental impact on Human Factors	4 hours

Stress due to Adverse Environment. Heat & Cold. Performance impact with respect to Light, Sound and Vibration. Preventive measures and Personal protective equipment.

Module:5	Organisational Ergonomics	4 hours

Goals/Targets and their achievements. Organisation behaviour. Occupational safety and hygiene practices. Training promotion and rewards. Organisational support -Workspace ambient environment. Compatibility, comfort, adaptability in Workplace.

Module:6	Cognitive Ergonomics and Design	4 hours

Cognitive and behavioural aspects in psychological ambience – Stereotype. Information is processing – attention, concentration, perception, memory, vigilance, planning and decision making. Mental workload –

Error, Failure and violations by human. Risk – perception and prevention. Cross-cultural Design.			
Module:7	**Industrial Aspects of Ergonomic Design**	4 hours	
Occupational safety to reduce fatigue, errors, failures, and accidents. Ergonomic design practices. Ergonomic practice checklists for Design. Workspace Design – Arm reach and extremity measures for Industrial Design. Humanising Design – Indian Scenario.			
Module:8	**Contemporary issues**	2 hours	
Contemporary discussion with the artists and designers.			
	Total Lecture hours:	**30 hours**	

Text Book(s)

1.	M.S.Sanders and Ernest J McCormick, 'Human factors in Engineering and Design', McGraw Hill International Editions, 2013.

Reference Books

1.	Karl Kroemer, Henrike Kroemer, Katrin Kroemer-Elbert, "ERGONOMICS" How to Design for Ease & Efficiency, Prentice Hall International Editions, 2001.
2.	Bridger RS, 'Introduction to Ergonomics', 2nd Edition, Taylor &Francis, 2003
3.	Green, W.S. and Jordan, P. W, Human Factors in Product Design, Taylor & Francis, 1999.
4.	D. Chakrabarti, Indian Anthropometric Dimensions for ergonomic design practice, National Institute of Design, Ahmedabad, 1997.

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar

List of Challenging Experiments (Indicative)

1.	Anthropometry	6 hours
2.	Grip Strength – Hand and Pinch	3 hours
3.	Hand strength and Back strength	3 hours
4.	RULA & REBA - Posture	6 hours
5.	Measurement of Environmental Factors	6 hours
6.	Borg Scale of perceived exertion	3 hours
7.	NASA TLX	3 hours
	Total Laboratory Hours	30 hours

Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	ELECTRONICS FOR DESIGNERS	L	T	P	J	C
BDE1005		2	0	2	0	3
Pre-requisite		Syllabus version				
		1				

Course Objectives:

1. To implement the foundational knowledge of electronics
2. To understand the principles of electronic circuits through experimental learning.
3. Ability to impart electronics knowledge in product designs.

Expected Course Outcome:

The students will have,

1. Thorough Knowledge of electric and electronic basics
2. Basic knowledge in electronic components and properties.
3. Understanding circuits and theorems.
4. Knowledge of dynamic circuits.
5. Understanding of the working of semiconductors.
6. Basic knowledge of sensors, actuators, etc.

Module:1	Introduction to electricity	4 hours

Electrons, electric current, conductors, insulator; cells & batteries, sources of power – chemical, solar, mains; current, voltage and power, power equations, Direct Current, Alternating Current; electrical circuits, pulses, waves, signals and noise.

Module:2	Introduction to basic electronic components and properties	4 hours

Resistance/resistor, capacitance/capacitor, Inductance/inductor, Batteries, voltage and current sources, wires and cables, switches, transducers – potentiometers & temperature sensors, fuses, Ohms law, voltmeters, ammeters

Module:3	Introduction to Resistive Circuits	4 hours

Resistive circuits, Kirchoff's laws, series, parallel, series-parallel circuits, voltage/current dividers, analysis of resistive circuits – node voltage, mesh current,

Circuit theorems – Source Transformations, Superposition, Thevenin's Theorem, Norton's Equivalent Circuit, Maximum Power Transfer

Module:4	Introduction to Dynamic Circuits	4 hours

Energy storage in capacitors/inductors, Series and parallel capacitors/inductors, Linear (First-order) RC, RL Circuits, Response and time constants.

Module:5	**Semiconductors**	**4 hours**
Introduction to Discrete Semiconductors: Single Junction – Diode, Uni-junction Transistor, Multi Junction – Bipolar Transistor, Field Effect Transistor, MOSFET, Thyristors - SCR, Triacs **Introduction to Photonic Semiconductors:** Light and optics, LEDs, Light detectors – Photo resistive, PN Junction – photodiodes, phototransistors, photodiodes thyristors; Solar Cells,		
Module:6	**Introduction to Integrated Circuits**	**4 hours**
Analog - Op-amp, voltage regulator, timer, multiplexer, comparators; **Digital -** Logic gate, flip flop, shift register, counter, encoder, decoder; Analog to Digital A/D, Digital to Analog D/A Conversions.		
Module:7	**Introduction to basic sensors, actuators and motors**	**4 hours**
IR, Light, Touch, Temperature, Reed, Tilt, etc., Linear and rotational actuators, Mechanical actuators, Piezoelectric actuators, etc., DC motor, stepper motor, servo motor, AC motors, Introduction to PCBs		
Module:8	**Contemporary issues:**	**2 hours**
Contemporary discussion with industry experts.		
	Total Lecture hours:	**30 hours**

Text Book(s)	
1.	Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuits Theory", 11e, Pearson India.
Reference Books	
1.	Charles K. Alexander, Matthew N.O. Sadiku, "Fundamentals of Electric circuits", McGraw-Hill Higher Education, 2007.
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar	

List of Challenging Experiments (Indicative)		
1.	Basics of electronics lab I: Identification of components, symbols, values, resistance color code, schematic circuits.	1 hours
2.	Basics of electronics lab II: Getting started with Multimeter, basic tools, breadboard, proto-board, safety.	1 hours
3.	Measuring voltage using batteries & resistances: measuring voltage of battery, resistance value of resistor, connecting resistances in series/parallel, potentiometers, and voltage divider networks.	2 hours
4.	Resistances and capacitors in DC circuits: capacitance value of capacitor, measuring voltage and current in simple circuits, series-parallel circuits, Time-Voltage measurement of RC circuit.	2 hours
5.	Testing of semiconductor devices: diodes, transistors.	2 hours

6.	Basic circuits with diode: voltage reducer, half-wave rectifier, full-wave rectifier, bridge rectifier.	2 hours
7.	Basic circuits with transistor: common-source, common-gate, common-drain.	2 hours
8.	Experiments with transformers and inductors**:** Transformer testing, electromagnet.	2 hours
9.	Experiments with simple circuits: battery, resistor, capacitor, switches, transistors and LED – simple switching circuit, relay oscillator, transistor switching.	2 hours
10	Experiments with Op-Amps: Summing, Differentiator, Integrator Circuits.	2 hours
11	Experiments using 555 timer IC: Flashing LED, touch switch, audio tones, a stable multi-vibrator circuit.	2 hours
12	Experiments using Logic gate ICs: Truth tables, building AND, OR gates using diodes and resistors.	2 hours
13	Experiments using function generator ICs: Square, triangle & sine wave generator circuits.	2 hours
14	Simple sensor circuits: touch, IR proximity, Automatic light switch.	2 hours
15	Simple actuator and motor circuits.	2 hours
16	Soldering practice.	2 hours
	Total Laboratory Hours	30 hours

Mode of assessment:			
Recommended by Board of Studies	12-03-2019		
Approved by Academic Council	No. 54	Date	14-03-2019

Course code	DESIGN HISTORY	L	T	P	J	C
BDE1006		1	2	0	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

To introduce the notion of Design as it evolved through the ages, from pre-historic times to a discipline in its own right.

Expected Course Outcome:

The Students will have,

1. Understand the evolution and History of Design.
2. Knowledge on the contributions of Bauhaus to industrial design.
3. Understanding of Design and its relationships in industrial design.
4. Understanding of designer's contribution to industrial design.

Module:1		4 hours
Evolution of Design as a discipline		
Module:2		4 hours
History of Industrial Design.		
Module:3		4 hours
Bauhaus and its impact on society; Contributions of Bauhaus to the field of industrial design		
Module:4		4 hours
The discoveries and inventions that have changed the world.		
Module:5		4 hours
Design and its relationship to art, craft and technology.		
Module:6		4 hours
Design and designers that have made a difference.		
Module:7		4 hours
Evolution of design and its relationship to the environment.		
Module:8	**Contemporary issues:**	**2 hours**
Contemporary discussion with the artists and designers.		
	Total Lecture hours:	**30 hours**

Text Book(s)

1. David Raizman; History of Modern Design, Prentice Hall, 2010

2.	Cross, N; Design Thinking: Understanding How Designers Think and Work, Berg, Oxford, 2011.		
Reference Books			
1.	Journal of Design History, Oxford Journals		
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar			
Mode of assessment:			
Recommended by Board of Studies	03-03-2018		
Approved by Academic Council	No. 49	Date	15-03-2018

Course code	DESIGN AND SOCIETY	L	T	P	J	C
BDE 1007		2	0	0	4	3
Pre-requisite		Syllabus version				
		v. 2				

Course Objectives:

In this course, the students will learn about:

1. Examine how institutions/organizations shape the ways that designs are Produced, Marketed, Understood, Purchased and Used by people across different sections of the society.
2. Explore issues of cross-cultural exchange in design and society.
3. Discuss innovation and change in art and design in relation to modernism, post-modernism, and globalization.
4. Learn about exploration of ideas relating to status of the design and Indian society, cross-cultural needs/requirements.
5. Observe, document and present the relationship between form and meaning, identity, technology, the body, interactions with the audience, and impact digital media in facilitating consumption.

Expected Course Outcome:

Upon Successful completion of this course, students will be able to:

1. Identify the key ideas and approaches used in the study of design and society.
2. Apply skills of visual analysis to interpret a broad range of design in relation to its social context.
3. Identify influence and inspiration drawn from cross-cultural interactions in design influencing society.
4. Research and access information about Design history and theory.
5. Present written and oral arguments about the ideas that inform design and its contributions to social needs from a wide range of periods and cultures.

Module:1	How design has contributed to addressing this basic human need.	**3 hours**
"Sense of Privacy: over human evolution.		
Module:2	Mass production and birth of Industrial Design	**6 hours**
Study the "Impact of Industrial Revolution" on human's consumption evolution.		
Module:3	Modern design influences from allied fields	**6 hours**
Implications in late 19th, 20th & 21st Century developments in Art, Architecture and Design changing societies through innovation and technology		
Module:4		**6 hours**
Influence of technology as an enabler for society's towards "accessing global markets for		

consumptions"		
Module:5	Human's compulsive need to consume more	**9 hours**
Reducing lifetime of products and constant need for more materials.		
Module:6	Trashing the world – Sustainable Design	**12 hours**
India – Becoming Worlds Waste Dumpyard – What can designers do to mitigate risks?		
Module:7		**12 hours**
Turn crisis, challenge into to opportunity? India can lead the way for developing nations		
Module:8	Contemporary issues: Expert Lecture	**6 hours**
Making of a responsible designers…are designers accountable at all? To Who, When & How?		
	Total Lecture hours:	**60 hours**

Text Book(s)	
1.	Papanek, V. (1984), "Design for the Real World", 2nd Edition, London: Thames & Hudson
2.	Whitely, Nigel; Design for Society Publisher: Reaktion Books, 1997, ISBN--10: 0948462655 ISBN--13: 978--0948462658, Reprinted 2014
3.	The Story of Design: From the Paleolithic to the Present Paperback – October 25, 2016 by Charlotte Fiell (Author), Peter Fiell (Author)
4.	Industrial Design in the Modern Age Hardcover – April 17, 2018 by Penny Sparke (Introduction)
Reference Books	
1.	Lidwell, W., Holden, K., Butler, J. [Ed] (2003). Universal Principles of Design, Rockport Publishers, USA, Singapore
2.	Routledge International Handbook of Participatory Design, Routledge Press, 2013
3.	Sparke, P; Introduction to Design and Culture in the 20th Century, Routledge, 2013
4.	The Product Ecology: Understanding Social Product Use and Supporting Design Culture ***Jodi Forlizzi School of Design, Carnegie Mellon University, Pittsburgh, USA – International Journal of Design Vol 2, No 1 (2008)***
5.	Bødker, M., & Browning, D. (2012). Beyond destinations: Exploring tourist technology design spaces through local-tourist interactions. Digital Creativity, 23(3-4), 204-224.

Mode of Evaluation: Assignment / FAT / Project			
Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	FORM STUDIES	L	T	P	J	C
BDE1008		0	0	4	4	3
Pre-requisite		Syllabus version				
		V.1				

Course Objectives:

1. To acquaint students with basics of form generation.
2. Obtain a knowledge of metamorphosis in form designing.
3. Obtain a knowledge and ability to use the appropriate tools to design and develop new forms.

Expected Course Outcome:

The students will have,

1. Ability to generate two dimensional rhythms, deformations and patterns in design.
2. Understanding in cognitive, morphological process inherent in applying form analogies for generating three-dimensional design concepts.
3. Ability to design a product of low complexity, relatively simple geometry and which utilizes a commonly available material and communicate the assembly procedure for the developed product.
4. Understanding semantic analysis of hand-held products and similar elements.
5. Ability to carry out syntactic analysis of hand-held products and similar elements.
6. Knowledge on pragmatic analysis of hand-held products and similar elements.

Module:1		**6 hours**

To generate two dimensional rhythms, deformations and patterns in design.

Module:2		**8 hours**

To develop an understanding of the cognitive, morphological process in designing a form.

Module:3		**8 hours**

To design a product of low complexity, relatively simple geometry and which utilizes a commonly available material such as cardboard.

Module:4		**8 hours**

To develop an understanding of the cognitive, morphological process inherent in applying form analogies for generating a product's form.

Module:5		**6 hours**

To carry out semantic analysis of hand-held products and similar elements.

Module:6		**10 hours**

To carry out syntactic analysis of hand-held products and similar elements.

Module:7		**10 hours**

To carry out pragmatic analysis of hand-held products and similar elements.			
Module:8	**Contemporary issues:**		**4 hours**
Contemporary discussion with the artists and designers.			
	Total Lecture hours:	**60 hours**	

Text Book(s)	
1.	Language of Vision, by Gyorgy Kepes and S Giedion, Literary Licensing, LLC (4 August 2012).
Reference Books	
1.	Elam, Kimberly; Geometry of Design: Studies in Proportion and Composition, Princeton Architectural Press, 2001.
2.	Bachelard, Gaston; Jolas, Maria (Translator); The Poetics of Space, Publisher: Beacon Press; Reprint edition, 1994.
Mode of Evaluation: Assignment / FAT / Project / Seminar	
Mode of assessment:	

Recommended by Board of Studies	12-03-2019		
Approved by Academic Council	No. 54	Date	14-03-2019

Course code	PRODUCT DESIGN	L	T	P	J	C
BDE1009		0	0	4	4	3
Pre-requisite		Syllabus version 1.0				
		1				

Course Objectives:

1. Understanding the user-centered design process
2. Understanding product aesthetics and human factors
3. Understanding holistic approach to problem-solving in product design

Expected Course Outcome:

The students will have,

1. Ability to carry out product design through proper observation.
2. Understanding on the cognitive, morphological process inherent in applying form analogies.
3. Understanding the cognitive, morphological process inherent in applying form analogies.
4. Ability to implement holistic design solution and to evaluate the prototype.

Module:1		**6 hours**	
Identifying the need /area of product to be designed			
Module:2		**8 hours**	
Identifying the nature of products through examples- analysis of existing products			
Module:3		**8 hours**	
Use of analogies to generate product forms			
Module:4		**8 hours**	
Product design by generative process, by inspiration, by iteration			
Module:5		**6 hours**	
Use of 'SCAMPER' to generate product design ideas			
Module:6		**10 hours**	
Use of metaphors to generate product forms			
Module:7		**10 hours**	
Study of iconic designers and their designs			
Module:8	**Contemporary issues:**	**4 hours**	
Discussions on contemporary issues with the designers.			

	Total Lecture hours:		**60 hours**	
Text Book(s)				
1.	Carma Gorman, "The Industrial Design Reader", Skyhorse Publishing, 2003			
Reference Books				
1.	Ulrich, Karl T, Eppinger, Steven D, 'Product Design and Development', McGraw-Hill, 2004.			
2.	Cagan, Jonathan, Vogel, Craig M, 'Creating breakthrough products: Innovation from product planning to program approval', Financial Times Prentice Hall, 2002.			
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar				
Mode of assessment:				
Recommended by Board of Studies	27-11-2019			
Approved by Academic Council	No. 57	Date	05-12-2019	

Course code	MATERIAL AND PROCESSES - METALS	L	T	P	J	C
BDE1011		2	0	0	4	3
Pre-requisite		Syllabus version				
		Syllabus version 1.0				

Course Objectives:

1. To understand the nature and qualities of metals.
2. To understand the various processing techniques for achieving desired form and color for newly designed products.
3. To give the fundamental knowledge of metal finishes and understand various properties of metals.

Expected Course Outcome:

The Students will have,

1. Thorough understanding of metals for designing of products.
2. Ability to analyze various metal products and understand its properties.
3. Knowledge on various metal properties for processes.
4. Understanding on various shaping attributes of metals.
5. Understanding on various joining attributes of metals.
6. Knowledge on various qualities of metals for surface finishing.

Module:1	4 hours

Role of science and technology, life of a metal, and materials in the design processes.

Module:2	4 hours

Classification of metals, Mechanical attributes, Tactile, visual, acoustic attributes of materials.

Module:3	4 hours

Process of metal selection for product design. Adoption of new metals.

Module:4	4 hours

Metal profiles with technical, eco, and aesthetic attributes.

Module:5	4 hours

Metals based on attributes of shaping profiles. (Competing processes, typical products, and environment.)

Module:6	4 hours

Metals based on attributes of joining profiles. (Welding, Adhesives, fasteners, etc.,)

Module:7		**4 hours**
Metals based on attributes of surface finishing. (Plating, Printing, polishing, coating, etc.,)		
Module:8	**Contemporary issues:**	**2 hours**
Contemporary discussions with industrial experts and designers.		
	Total Lecture hours:	**30 hours**

Text Book(s)	
1.	Ashby, Michael, Johnson, Kara, 'Materials and Design: The Art and Science of Material Selection in Product Design', Butterworth-Heinemann, 2002.
Reference Books	
1.	Thompson R, 'Manufacturing process for design professionals', Thames and Hudson, London, 2007.
2.	Garratt J, 'Design and Technology', Cambridge University Press, UK, 2004.

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar			
Mode of assessment:			
Recommended by Board of Studies	12-03-2019		
Approved by Academic Council	No. 54	Date	14-03-2019

Course code	MATERIAL AND PROCESSES - NON-METALS	L	T	P	J	C
BDE1013		2	0	0	4	3
Pre-requisite		Syllabus version				
		1.0				

Course Objectives:

1. To understand the nature and qualities of non-metals.
2. To understand the various processing techniques for achieving desired form and color for newly designed products.
3. To give the fundamental knowledge of non-metal finishes and understand various properties of non-metals.

Expected Course Outcome:

The Students will have,

1. Thorough understanding of non-metals for designing of products.
2. Ability to analyze various non-metal products and understand its properties.
3. Knowledge on various non-metal properties for processes.
4. Understanding on various shaping attributes of non-metals.
5. Understanding on various joining attributes of non-metals
6. Knowledge on various qualities of non-metals for surface finishing.

Module:1		4 hours

Material evolution and materials in the design process.

Module:2		4 hours

Classification of non-metals, Elastic modulus and density. Tactile, visual, acoustic attributes of materials.

Module:3		4 hours

Process of non-metals selection for product design. Adoption of new materials.

Module:4		4 hours

Non-Metal profiles with technical, eco, and aesthetic attributes.

Module:5		4 hours

Non-Metals based on attributes of shaping profiles. (Competing processes, typical products, and environment.)

Module:6		**4 hours**	
Non-Metals based on attributes of joining profiles. (Adhesives, fasteners, etc.,)			
Module:7		**4 hours**	
Metals based on attributes of surface finishing. (Printing, polishing, coating, etc.,)			
Module:8		**2 hours**	
Contemporary discussion with industrial experts and designers.			
	Total Lecture hours:	**30 hours**	

Text Book(s)	
1.	Ashby, Michael, Johnson, Kara, 'Materials and Design: The Art and Science of Material Selection in Product Design', Butterworth-Heinemann, 2002.
Reference Books	
1.	Thompson R, 'Manufacturing process for design professionals', Thames and Hudson, London, 2007.
2.	Garratt J, 'Design and Technology', Cambridge University Press, UK, 2004.

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar			
Mode of assessment:			
Recommended by Board of Studies	12-03-2019		
Approved by Academic Council	No. 54	Date	14-03-2019

Course code	ADVANCED IMAGE REPRESENTATION TECHNIQUES	L	T	P	J	C
BDE2001		0	0	4	4	3
Pre-requisite		Syllabus version				
		v.1.0				

Course Objectives:

4. Understanding the representation principles and applying to various projects
5. Ability to Make imagery through memory and imagination
6. Ability to do image manipulation and form high fidelity renderings

Expected Course Outcome:

The students will have,

1. Ability to generate and represent concepts through sketching
2. Understanding on mimic Imagery and abstraction through memory and imagination.
3. Ability to express Image through various set time and space using Image manipulation techniques.
4. Ability to express colour form and structure through Image making software

Module:1		**6 hours**
Representing the observed and Representing concepts - Sketching for ideation		
Module:2		**8 hours**
Mimetic Imagery and Abstraction & Memory and Imagination		
Module:3		**8 hours**
History of Art and Aesthetics		
Module:4		**8 hours**
Expression and Imagery & Time and Space in Image		
Module:5		**6 hours**
Migration of forms and Image manipulation		
Module:6		**10 hours**
Metamorphosis through form, colour and structure		
Module:7		**10 hours**
Advanced exposure and demonstration to Illustration and Image making software		
Module:8	Contemporary issues:	4 hours
Contemporary discussion with the artists and designers.		
	Total Lecture hours:	**60 hours**

Text Book(s)	
1.	McKim, Robert; Experiences in Visual Thinking, Publisher Brooks/Cole Publishing Company, 1980
2.	Missal, Stephen; Exploring Drawing for Animation (Design Exploration Series), Thomson Delmar Learning, 2003
Reference Books	
1.	D. K. Francis Ching; Design Drawing, John Wiley & Sons,1998
2.	Porter, Tom; Design Drawing techniques for architects, graphic designers and artists, Oxford; Architectural Press,1991
3.	Dalley Terence ed.; The complete guide to illustration & design, Phaidon, Oxford, 1980
4.	T. C. Wang; Pencil Sketching, John Wiley & Sons,1997
5.	Caplin, Steve; Banks, Adam; The Complete Guide to Digital Illustration Publisher: Watson-Guptill Publications, 2003
6.	Arnheim, Rudolph; Visual Thinking: University of California Press 2004

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar			
Mode of assessment:			
Recommended by Board of Studies	03-03-2018		
Approved by Academic Council	No. 49	Date	15-03-2018

BDE2002	DESIGN FUNDAMENTALS – 3D	L	T	P	J	C
Pre-requisite		0	0	4	4	3
Anti requisite		Syllabus version				
		v. 1				

Course Objectives:

1. Understanding the fundamentals of 3-dimensional design.
2. Understanding the elements of design for 3-dimension.
3. Obtain a knowledge and ability to use the appropriate tools to design and develop new forms for required products.

Expected Course Outcome:

The students will have,
1. Ability to generate rhythms, deformations and patterns in forms.
2. Understanding in cognitive, morphological process inherent in applying shape analogies for generating three-dimensional design concepts.
3. Ability to design a composition of low complexity and with relatively simple geometry.
4. Understanding to carry out semantic analysis of visual elements.

Module:1		**6 hours**
Understanding the various elements and principles of art and design in 3D.		
Module:2		**8 hours**
Expressions and explorations using volumes and its relation in context to nature and environment.		
Module:3		**8 hours**
Study and understanding the form transition and morphology.		
Module:4		**8 hours**
Principles of colour theory and explorations on the forms.		
Module:5		**10 hours**
Exposure to form and movement		
Module:6		**10 hours**
Visual relationships – Balance, proportion, order, symmetry, rhythm, etc.,		
Module:7		**4 hours**
Concept form development using different mediums.		
Module:8	**Contemporary issues:**	**4 hours**
Contemporary discussion with the artists and designers.		
	Total Lecture hours:	**60 hours**

Text Book(s)

1.	Kepes, Gyorgy; Language Of Vision, Dover Publications, 1995
2.	Elam, Kimberly; Geometry Of Design: Studies In Proportion And Composition, Princeton Architectural Press, 2001
3.	Bachelard, Gaston; Jolas, Maria (Translator); The Poetics Of Space, Publisher: Beacon Press; Reprint edition, 1994

Reference Books

1.	Hannah, Gail Greet; Elements Of Design, Princeton Architectural Press, 2002

Mode of Evaluation: Assignment / FAT / Project / Seminar			
Mode of assessment:			
Recommended by Board of Studies	03-03-2018		
Approved by Academic Council	No. 49	Date	15-03-2018

Course code	DESIGN STUDIO – PROBLEM ANALYSIS	L	T	P	J	C
BDE2003		0	0	4	4	3
Pre-requisite		Syllabus version				
		V.1				

Course Objectives:

1.To understand the different problem analyzing techniques
2.To understand various mind mapping techniques
3.To develop new products using various design methodologies

Expected Course Outcome:

The students will have,

1. Creating ability for affinity mapping and Temporal spatial mapping on an existing idea.
2. Ability to do Mind mapping.
3. Knowledge on Sensory and Cognitive mapping.
4. Ability to develop new product through semiotic analysis.

Module:1		**6 hours**
Affinity mapping on an existing idea/concept/product/system		
Module:2		**8 hours**
Temporal spatial mapping on an existing idea/concept/product/system		
Module:3		**8 hours**
Mind mapping on an existing idea/concept/product/system		
Module:4		**8 hours**
Sensory mapping on an existing idea/concept/product/system		
Module:5		**6 hours**
Cognitive mappings on an existing idea/concept/product/system		
Module:6		**10 hours**
Semiotic analysis on an existing idea/concept/product/system		
Module:7		**10 hours**
Opportunity for a new development of product/system/service		
Module:8	**Contemporary issues:**	**4 hours**
Contemporary discussion with the artists and designers.		
	Total Lecture hours:	**60 hours**

Text Book(s)

1. Ulrich, Karl T., Eppinger, Steven D.; Product Design and Development, McGraw-Hill, 5th edition (May 5, 2011)

Reference Books	
1.	Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions By Bruce Hanington. Rockport Publishers; 58480th edition (February 1, 2012)
2.	Delft Design Guide: Design Strategies and Methods. BIS Publishers (April 1, 2014)
Mode of Evaluation: Assignment / FAT / Project / Seminar	
Mode of assessment:	

Recommended by Board of Studies	09-12-2018		
Approved by Academic Council	No. 53	Date	13-12-2018

Course code	SMART PRODUCT DESIGN	L	T	P	J	C
BDE3002		0	0	4	4	3

Pre-requisite		Syllabus version
		v. 1.0

Course Objectives:

1. Understanding the user-centred design process.
2. Understanding the trend and play along with the new evolved product design.

Expected Course Outcome:

1. Understanding the evolution of smart products.
2. Ability to generate design concepts using smart product components.
3. Understanding the smart eco system.
4. Ability to integrate IOT in new products and to evaluate the prototype.

Module:1		**6 hours**
Smart Product history and evolution.		
Module:2		**8 hours**
Familiarizing smart product components -1		
Module:3		**8 hours**
Familiarizing smart product components - 2		
Module:4		**6 hours**
Electronic programming – 1		
Module:5		**6 hours**
Electronic programming – 2		
Module:6		**10 hours**
Introduction to smart product eco-system.		
Module:7		**10 hours**
Integration of IOT in products.		
Module:8	**Contemporary issues:**	**4 hours**
Contemporary discussion with the artists and designers.		
	Total Lecture hours:	**60 hours**

Text Book(s)

1. **Smart Product Design,** Hardcover – August 1, 2017, Send points Publishing Co ltd

Reference Books

1. Smart things, Ubiquitous Computing User Experience Design , Mike Kuniavsky

Mode of Evaluation: Assignment / FAT / Project / Seminar

Recommended by Board of Studies	24-09-2020		
Approved by Academic Council	No. 59	Date	24-09-2020

SYLLABUS FOR

PROGRAM ELECTIVE

COURSES

Course code	Computer Modelling and Simulation Techniques	L	T	P	J	C
BDE 1010		0	0	4	4	3
Pre-requisite		Syllabus version				
		V.1.0				

Course Objectives:

The students will be able to,

1. Work on digital expression of industrial design.
2. Use digital mediums for 2D and 3D modelling.
3. Render and create high quality photo realistic simulation of products

Expected Course Outcome:

The students will have ability to,

1. Develop and edit digital representational inputs.

2. Understand 3D digital modelling tools and techniques.

3. Learn to use different digital mediums for product modelling.

Module:1		2 hours
Introduction to 2D and 3D digital tools – History and software evolution.		
Module:2		**6 hours**
3D modelling – Perspective and orthographic views.		
Module:3		**6 hours**
Understanding the basic principles and methods of 3D modelling.		
Module:4		**6 hours**
Exercises on creating basic geometric forms.		
Module:5		**16 hours**
Exercises on part modelling.		

Module:6		**12 hours**	
3D modelling - Exercises on part modelling and assembly.			
Module:7		**10 hours**	
3D modelling and simulation – exercises on simulations.			
Module:8		**2 hours**	
Contemporary discussions with industrial experts and designers.			
	Total Lecture hours:	**60 hours**	

Text Book(s)

1.	Modeling and Simulation Paperback – 2012 by Pushpa Singh (Author), Narendra Singh (Author)

Reference Books

1.	Modeling and Simulation using MATLAB - Simulink, 2ed Paperback – 2015 by Shailendra Jain
2.	SOLIDWORKS 2019 Learn by doing: Sketching, Part Modeling, Assembly, Drawings, Sheet metal, Surface Design, Mold Tools, Weldments, MBD Dimensions, and Rendering – 2019
3.	Autodesk Fusion 360 For Beginners: Part Modeling, Assemblies, and Drawings - 2019

Mode of Evaluation: Assignment / FAT / Project

Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	5-12-2019

Course code	GRAPHIC DESIGN	L	T	P	J	C
BDE1012		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 01.01				

Course Objectives:

In this course, the students will learn about:

1. Define Principles, Elements of visual design influencing product aesthetics.
2. Explore different aspects of product drawings and representation techniques using multiple mediums for presentations.
3. Understand classification and types of products design
4. Analyze different product categories (tangible & virtual) with respect to their interface design (Display and Controls) as Human Machine Interface (HMI).

Expected Course Outcome:

At the end of this course students will be able to:

1. Explain the Principles and Elements of Visual Design with reference to product design
2. Experiment with Media Explorations of Product sketching/rendering suitable for presentation.
3. Define, Identify and Build graphic elements in product design
4. Demonstrate application of Product interface design to propose design enhancement on existing products/propose new product designs with interaction interfaces.

Module:1		2 hours
Concept of visual language and visual design		
Module:2		1 hours
Fundamentals of Interaction - Hierarchy of Functions, Placement & Sequencing,		
Module:3		1 hours
Nomenclature (Labeling) & Icon Design, Readability - Semantics		
Module:4		2 hours
Introduction to typography and fonts applied in tangible product designs		
Module:5	Learning to make product illustrations using different techniques & mediums	12 hours
Module:6		12 hours
Introduction to object drawing (Freehand, Isometric, Axonometric and Orthographic projections)		
Module:7		9 hours
Theory of perspective, one point, two point perspective and three point perspective		

Module:8		2 hours
Importance of Product Graphics through Case studies		
Module:9		2 hours
Product Attributes Function and Emotion		
Module:10		3 hours
Product Configurations and Component relationships (Component Matrix)		
Module:10		2 hours
Product as abstractions – Design Inspirations		
Module:11		6 hours
Investigations and study of visual, functional and ergonomic requirements of control and display interfaces.		
Module:12		6 hours
Color, Form and Texture – Exploring Emotions and Sensibilties		
	Total Lab hours:	**60 hours**

Text Book(s)

1.	Design Basics, From Ideas to Products by Gerhard Heufler, 2004
2.	The Elements of Graphic Design / Edition 2 by Alex W. White ISBN-10: 1581157622, ISBN-13: 9781581157628, Pub. Date: 03/15/2011 Publisher: Allworth
3.	Design Rendering Techniques: A Guide to Drawing and Presenting Design Ideas by Dick Powell Published by North light (first published January 1986) ISBN 0891341250 (ISBN13: 9780891341253)
4.	Isometric / 3D Grid Notebook - 1/4" Discreet Grid Design - Sequentially Numbered - Graph Paper Journal: Architectural, Interior & Industrial Design, 3D Maps and Engineering - BLUE: Inventions Paperback – December 27, 2018 by Createmplative (Author), Joseph Christensen (Contributor)
5.	Design Sketching Published by Erik Olofsson and Klara Sjölén (2006) ISBN: 9197680702 (ISBN13: 9789197680707)
6.	Graphic Design: A Concise History, Second Edition (World of Art) Paperback – June, 2002 by Richard Hollis, **Publisher:** Thames & Hudson; Second edition (June 2002) **ISBN-10:** 0500203474 **ISBN-13:** 978-0500203477
7.	Learning Curves: An Inspiring Guide to Improve Your Design Sketch Skills by Klara Sjölén, Allan Macdonald, Published by KEEOS Design Books, 2011, ISBN 9163389525, 9789163389528
8.	Carl Liu's Design Book BY Chuan-kai (Carl) Liu, Published by Long Sea International Book,

	2004, ISBN 9579437831, 9789579437837
9.	How to Think Like a Great Graphic Designer Paperback by Debbie Millman, Published by Skyhorse Publishing Inc., 2007 ISBN 1581154968, 9781581154962
10.	Sketching: Drawing Techniques for Product Designers by Koos Eissen and Roselien Steur. Published by Laurence King Publishing, 2019 ISBN 9063695330, 9789063695330
11.	Sketching, Product Design PresentationAuthors Koos Eissen, Roselien Steur, Publisher Laurence King Publishing, 2014 ISBN 906369329X, 9789063693299
12.	Sketching: The Basics by Koos Eissen, Roselien Steur, Published by BIS, 2011, 9063692536, 9789063692537
13.	Drawing for Product Designers by Kevin Henry Published by Laurence King Publishing, 2012 ISBN 1856697436, 9781856697439
14.	Perspective Sketching: Freehand and Digital Drawing Techniques for Artists & Designers BY Jorge Paricio Rockport Publishers, 2015 ISBN 1631590324, 9781631590320
Reference Books	
1.	Understanding Industrial Design: Principles for UX and Interaction Design 1st Edition by Simon King (Author), Kuen Chang (Author) O'Reilly Media, Inc.", 2016 ISBN 149192036X, 9781491920367
2.	Everyday Modern: The Industrial Design of Alfonso Iannelli by David Jameson (2015) **Paperback Published by** Bronze Man Books ASIN: B019NEKP6W
3.	Materials and Design, Third Edition, The Art and Science of Material Selection in Product Design, Michael F. Ashby, Kara Johnson |2014|
4.	Concept Design Books by Scott Robertson Published by Titan Books Limited, 2006 ISBN 184576286X, 9781845762865
5.	Presentation Techniques by Dick Powell Published by North Light Books, 1986 ISBN 0891341250, 9780891341253
6.	**Analog Dreams by Michale DiTullo** Published by Blurb, 2010 ISBN 1389285448, 9781389285448
Mode of Evaluation: CAT / Assignment / FAT / Project	

Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	CREATIVE EXPLORATION TECHNIQUES	L	T	P	J	C
BDE1014		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 01.00				

Course Objectives:

In this course, the students will learn about:

1. Define creativity and State conditions when an idea become Innovation - Cognitive issues in creative thinking
2. Explain Left brain & Right Brain thinking - Neurobiological studies of human brain lateralization with respect of creative thinking phenomena
3. Explore ways of Thinking Introduction to knowledge engineering and management, Modelling of Design Thinking and Tacit knowledge representation, Fuzzy thinking, vertical thinking, lateral thinking
4. Understand Convergent and Divergent Thinking Tools and Techniques to generate ideas
5. Role of creativity in Innovation and Invention; Comparative studies of creativity in the Arts, Sciences, Engineering and Design, Design Futures: Future casting, Case Studies
6. What, When, Where, Which, Who & Why: Introduction to Intellectual Property Rights.

Expected Course Outcome:

At the end of this course, the students will be able to:

1. Explain cognitive issues in creative thinking
2. Describe the working of a human brain while generating ideas
3. Define knowledge engineering and management and Summarise types of creative thinking
4. Demonstrate generation of ideas using different tools and techniques for a given context
5. Compare and classify creativity in Innovation and Invention the Arts, Sciences, Engineering and Design.
6. Analyze and Present: Select a case study of a design application for Intellectual Property Rights

Module:1		**3 hours**
Cognitive issues in creative thinking		
Module:2		**3 hours**
Neurobiological studies of human brain lateralization with respect of creative thinking phenomena.		
Module:3		**3 hours**
Introduction to knowledge engineering and management		
Module:4		**6 hours**
Modelling of Design Thinking and Tacit knowledge representation		
Module:5		**9 hours**

Fuzzy thinking, vertical thinking, lateral thinking.		
Module:6		**12 hours**
Convergent and Divergent Thinking – Familiarise with Tools and Techniques to generate ideas		
Module:7		**10 hours**
Role of creativity in Innovation and Invention: Comparative studies of creativity in the Arts, Sciences, Engineering and Design		
Module:8		**9 hours**
Design Futures : Future casting, Case Studies		
Module:9		**3 hours**
Issues in Intellectual Property Rights - Select a case study of a design application for Intellectual Property Rights.		
	Total Lab hours:	**60 hours**

Text Book(s)

1.	Lateral Thinking, by Bono Edward De Publisher: Penguin UK (2 March 2010) ISBN-10: 0141033088 ISBN-13: 978-0141033082
2.	Serious Creativity - How to be creative under pressure and turn ideas into action, Edward de Bono, Penguin books Published: 05/03/2015 ISBN: 9780091939700
3.	Crash Course in Creativity (Crash Course (Stylus)) by Brian Clegg **(Author),** Paul Birch **(Author),** Kogan Page Business Books (September 2004)
4.	The Big Book of Creativity Games: Quick, Fun Activities for Jumpstarting Innovation, by Robert Epstein **(Author)** McGraw-Hill Education; 1 edition (August 17, 2000).
5.	Creating Breakthrough Products: Revealing the Secrets that Drive Global Innovation 2013, by Jonathan Cagan and Craig M. Vogel.
6.	Creative Like da Vinci: Practical Everyday Creativity for Idea Generation, New Perspectives, and Innovative Thinking Paperback – October 18, 2018 by Peter Hollins Publisher: Independently published (October 18, 2018) ISBN-10: 1728935938 ISBN-13: 978-1728935935
7.	Teaching Creative Thinking: Developing learners who generate ideas and can think critically (Pedagogy for a Changing World) Paperback – December 19, 2017 by Bill Lucas (Author), Ellen Spencer (Author), Publisher: Crown House Publishing (December 19, 2017) ISBN-10: 1785832360 ISBN-13: 978-1785832369
8.	Developing Creative Thinking in Beginning Design Stephen Temple Sep 26, 2018 Publisher: Routledge; 1 edition (September 20, 2018) ISBN-10: 1138654868 ISBN-13: 978-1138654860

9.	Developing Creativity in the Classroom, Todd Kettler Ph.D, Kristen N. Lamb, Dianna R. Mullet, Ph.D Dec 1, 2018 Publisher: Prufrock Press (December 1, 2018) ISBN-10: 1618218042 ISBN-13: 978-1618218049
10.	S. D. Savransky, Engineering of Creativity – Introduction to TRIZ method of inventive problem solving, CRC Press, 2000
Reference Books	
1.	M. Runio and S. Pritzker (eds.), Encyclopedia of Creativity, Academic Press, 1999.
2.	G. Schreiber, H. Akkermans, A. Anjewierden, R. de Hoog, N. Shadbolt, W. Van de Velde and B. Wielinga, Knowledge Engineering and Management, MIT Universities Press India Ltd, 2000.
3.	
4.	E. De Bono, Serious Creativity, INDUS Harper Collins Publishers India, 1992.
5.	D. Morey, M. Maybury and B. Thuraisingham, Knowledge Management, Universities Press MIT, 2000

Mode of Evaluation: Assignment / FAT / Project			
Mode of evaluation:			
Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	PRODUCT DETAILING AND MECHANISMS	L	T	P	J	C
BDE1015		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

The students will be able to,

1. Understand the fundamentals of products detailing.
2. Understand the Basic mechanisms of product parts.
3. Assemble the parts with relevant assembling techniques.
4. Design products using different types of mechanisms.

Expected Course Outcome:

The students will have,

1. Ability to generate parts using modelling techniques.
2. Create reverse engineering of a given component..
3. Ability to make assembly drawings of the models.
4. Understanding to make draft for mould manufacturing.
5. Ability to use rapid manufacturing techniques to create prototype.

Module:1		4 hours	

Introduction - Detailing in plastic products.

Module:2		4 hours	

Detailing in mechanisms – Gears and gear trains, Belt and Chain drives, Cam and Followers, and Linkages.

Module:3		4 hours	

Design detailing for fabricated products in sheet metal, steel tubes, angles, aluminum sheets and extruded sections.

Module:4		8 hours	

Detailing while using fabric materials - foam and other cushions, leather and cloth in combination with materials like wood and metal.

Module:5		**8 hours**	
Design detailing for wood products in soft wood, hard wood and man-made wood.			
Module:6		**12 hours**	
Disassemble and assembling of specific products, and identify the details like materials, joineries, fits, mechanisms and assembly techniques.			
Module:7		**16 hours**	
Re-design the selected products and propose new design with alternative materials, joineries, fits and mechanisms (Working prototype)			
Module:8		**4 hours**	
Contemporary discussions with industrial experts and designers.			
	Total Lecture hours:	**60 hours**	

Text Book(s)

1.	Robert A. Malloy, Plastic Part Design for Injection Molding, Hanser Publication, 2010

Reference Books

1.	507 Mechanical Movements: Mechanisms and Devices (Dover Science Books) Paperback – 15 Aug 2005 – Author-Henry T Brown

Mode of Evaluation: Assignment / FAT / Project

Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	Collaborative Design Project	L	T	P	J	C
BDE1016		0	0	0	12	3
Pre-requisite	Completion of minimum of Two semesters	Syllabus version				
		v. 1.0				

Course Objectives:

Collaborative design project would allow for students to work as a group simulating a professional set-up trying to solve system level design issues, assuming different roles and responsibilities.
This course is open to interested B tech students to encourage collaboration among cross- disciples.

Expected Course Outcome:

At the end of the course the student should be able to:
1. Work as a team solving a relatively complex design problem
2. Develop the ability to engage in research and to involve in life-long learning.
3. Comprehend contemporary issues.
4. Take up a common problem and solve it as a group with collaborative efforts.

Contents

The students will take up a common problem and solve it as a group with collaborative efforts.

Mode of Evaluation: Internship Report, Presentation and Project Review

Recommended by Board of Studies	24-09-2020		
Approved by Academic Council	61	Date	18-02-2021

Course code	RE-DESIGN PROJECT	L	T	P	J	C
BDE1017		0	0	0	8	2
Pre-requisite	Completion of minimum of Two semesters	Syllabus version				
		v. 1.0				

Course Objectives:

Re-design project would allow for students to apply his/her learning until now in identifying problems to solve in an existing solution and redesign it by following a design process and come out with innovative and appropriate solutions.

Expected Course Outcome:

At the end of the course the student should be able to:
1. Develop the ability to engage in research and to involve in life-long learning.
2. Comprehend contemporary issues.
3. Take up a common problem and solve it following the design process.

Contents

- An independent student project based on student inclination and interest.
- This project allows students to identify a problem to solve and then address different issues pertaining to various segments under different contexts and environments.
- The project also encourages students to adopt appropriate design process and methods to solve the chosen problem.

Mode of Evaluation: Internship Report, Presentation and Project Review

Recommended by Board of Studies	24-09-2020		
Approved by Academic Council	59	Date	24-09-2020

Course code	POTTERY	L	T	P	J	C
BDE1018		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.00				

Course Objectives:

1. To acquaint students with basics of pottery.
2. Obtain a knowledge on various hand tools and hand building techniques using clay.
3. Obtain a knowledge and ability to use the appropriate construction techniques to design using clay.

Expected Course Outcome:

1. Ability to successfully manipulate clay through the basic hand building techniques of coil, pinch, and slab
2. Apply skills to manipulate clay on the potters wheel (wheel throwing)
3. Ability to embellish the surface in an expressive and meaningful way using slips.
4. Thorough understanding of Bisqueting and Glazing
5. Ability to discuss, in an articulate, thoughtful manner during class critiques, the meaning, design, and technical processes used to create ceramic art objects
6. Ability to produce decorative and functional ceramic pieces.

Module:1		6 hours	

Introduction to three hand building techniques Pinch, coil and Slab

Module:2		8 hours	

Introduction to various drying stages of clay and various firing stages of clay Greenware, Bisqueware, Glazeware etc

Module:3		8 hours	

Exercises on Sculpting with clay using hand tools and joining methods

Module:4		8 hours	

Exercise on Slab, Pinching and Coiling

Module:5		6 hours	

Introduction to potter's wheel and wheel throwing.

Module:6		10 hours	

Exercise on Bisqueting

Module:7		10 hours	

Exercise on Glazing			
Module:8	Contemporary issues:	4 hours	
Contemporary discussion with the artists and designers.			
	Total Lab hours:	60 hours	

Text Book(s)	
1.	Sunshine Cobb; Mastering Hand Building: Techniques, Tips and Tricks for Slabs, Coils, and More , 2018
Reference Books	
1.	Ben Carter; Mastering the Potter's Wheel: Techniques, Tips, and Tricks for Potters

Mode of Evaluation: Assignment / FAT / Project			
Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	57	Date	05-12-2019

Course code	CARPENTRY	L	T	P	J	C
BDE1019		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.00				

Course Objectives:

1. Understand and apply proper safety practices to the woodworking workshop.
2. Ability to safely use non-powered woodworking tools.
3. Ability to safely use portable and stationary power tools
4. Ability to work with various wood materials

Expected Course Outcome:

1. Acquire practical skills in wood cutting, joining and other allied operations.
2. Apply knowledge and practical skills in engineering measurements.
3. Acquire experience in preventive and corrective maintenance of various cutting tools, machine tools and equipment
4. Ability to do various kinds of work and working procedures.
5. Apply skills to work with various joints and perform finishing work.

Module:1		6 hours

Introduction to Carpentry: Safety Training, Relationship between timber, Tools and Carpentry.

Module:2		8 hours

Carpentry Tools Classification of Tools, Measuring and Marking, Holding, Cutting, Grooving, Planing, Striking, Boring and Miscellaneous Tools, Care and maintenance of Tools, Precautions to be taken while using carpentry tools, Sharpening tools, Wood working machines, Wood working lathe, Wood sawing machine, etc.

Module:3		8 hours

Basic Drawing and Calculations: Instruments for drawing, Preliminary practice, Different methods, Orthographic drawing, Isometric drawing, Oblique drawing, Perspective drawing, Freehand drawing or sketching. Units of measurement, How to measure and calculate, Examples on Calculations.

Module:4		8 hours

Types of Work and Working Procedure: Marking, Sawing, Planing, Chiselling, Boring, Striking, Checking, Sharpening

Module:5		6 hours

Joints in Carpentry work: Lengthening/Widening Joints, Corner Joints, Framing Joints, Preparation of timber and making joint, Precautions in making a joint.

Module:6		10 hours

Working with Nails, Screws and Other Materials: Nails, Screws, Dowels, Bolts and Nuts,

Glue; Types of Glue, (Casein Glue, Animal Glue, Vegetable Glue, Synthetic resin)			
Module:7		10 hours	
Finishing Work: Classification, Stains and Preservations, Wood filling, Polishing, Paints			
Module:8	Contemporary issues:	4 hours	
Contemporary discussion with the artists and designers.			
	Total Lab hours:	60 hours	
Text Book(s)			
1.	Colin Eden-Eadon and DK; Woodwork: A Step-by-Step Photographic Guide,2010		
2.	Peter Korn; Woodworking Basics, 2003		
Reference Books			
1.	Terrie Noll; The Joint Book: The Complete Guide to Wood Joinery, 2002		
2.	Bob Flexner; Understanding Wood Finishing, 1994		
Mode of Evaluation: Assignment / FAT / Project			
Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	57	Date	05-12-2019

Course code	DESIGN THINKING	L	T	P	J	C
BDE1020		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

In this course, the student will learn about:What design thinking is and when to use it

- How to prepare to see and take action when opportunity arises – Problem/Opportunity identification, develop sound hypotheses, collect and analyse appropriate data, and develop ways to collect meaningful feedback in a real-world environment
- Familiarize with different Design Thinking Frameworks
- Need to be Empathetic, Empathy mapping and rapport building to understand and seek clarity on the identified issue
- How to use design thinking to generate innovative ideas (Convergent & Divergent Thinking)
- How to take the many ideas generated and determine which ones are likely to produce specific, desired outcomes
- Translate broadly defined opportunities into actionable innovation possibilities and recommendations for key stakeholders through drawings, models and concise comprehensive presentation.
- Apply compelling communication strategies (diagramming and storytelling) for final presentation of designed solutions with emphasis on Design Thinking process.

Expected Course Outcome:

At the end of this course, the students will:

1. Apply the theory of Design Thinking to public design challenges.
2. Use their skills and knowledge to identify and communicate public concerns from the perspective of those living in the communities along the Green Line.
3. Have a deep understanding with empathy of community members and their underlying needs and values-- especially those typically under-represented in current approaches--by having engaged community members through a variety of methods (interviews, photography, diagraming, personal experiences, recordings, self-documentation, writing).
4. Collaborate with other students who have varied perspectives and areas of expertise to formulate and prioritize community concerns and provide opportunities for change.
5. Ability to generate ideas using Creative thinking tools and techniques.
6. Seek consultation from and establish collaborations with members and leaders of various communities, organizations, and agencies to develop innovative approaches to community engagement, problem- seeking (and reframing), and problem-solving in local communities.
7. Create compelling narratives and presentations through visual communication and storytelling.

Module:1	What design thinking is and when to use it	3 hours

- Introduction to Design Thinking, its systematic application using Design Process in a context.

Module:2	How to prepare to see and take action when opportunity arises	9 hours

- How to prepare to see and take action when opportunity arises – Problem/Opportunity

identification, develop sound hypotheses, collect and analyze appropriate data, and develop ways to collect meaningful feedback in a real-world environment. • Ranking of problem statements		
Module:3	Familiarize with different Design Thinking Frameworks	6 hours
• Familiarize with different Design Thinking Frameworks • Create list of problem statements for selecting to work on		
Module:4	Need to be Empathetic	9 hours
• "Empathy" work , plan and responsibilities • Reflection 1 - Project presentations and review • Reframe the problem statement based on analysis and feedback		
Module:5	How to use design thinking to generate innovative ideas	3 hours
• Ideation using Creative tools and techniques – Make Sketches, Drawing of ideas explorations • identify possible relevant ideas to create proposed ideas as presentable renderings to finalise		
Module:6	How to determine which ideas are likely to produce specific, desired outcomes	12 hours
• Reflection 2 - Project ideas presentations and review		
Module:7	Develop designs and evaluate its effectiveness	9 hours
• Evaluate the effectiveness of final proposed solution with target audience and document scope of improvement based on user feedback. • Incorporate the suggested enhancement in the final solution.		
Module:8	Final presentation for course evaluation	15 hours
• Make detailed comprehensive design document consisting of the entire Design thinking process. • Presentation needs to be supported with artefacts (sketch books, project diary, charts & flow diagrams, models/prototypes) as Final project submission for evaluation		
	Total Course hours:	**60 hours**

Text Book(s)

1.	Bruce Hannington and Bella Martin, Universal Methods of Design: 100 Ways to Research Complex Problems, Develop Innovative Ideas, and Design Effective Solutions (Rockport Publishers, 2012)
2.	Don Norman, The Design of Everyday Things (Basic Books, 2013)
	• Dan Roam, The Back of the Napkin (Expanded Edition): Solving Problems and Selling Ideas With Pictures (Portfoilo, 2013)
3.	IDEO.org, The Field Guide to Human Centered Design (IDEO.org, 2015)
4.	Jeanne Liedtka and Tim Ogilvie Designing for Growth: A Design Thinking Tool Kit for Managers (Columbia University Press, 2011)

5.	Jeanne Liedtka, Tim Ogilvie, and Rachel Brozenske, The Designing for Growth Field Book: A Step-by-Step Project Guide (Columbia University Press, 2014)
Reference Books	
1.	Jeanne Liedtka, Randy Salzman, and Daisy Azer, Design Thinking for the Greater Good: Innovation in the Social Sector (Columbia Business School Publishing, 2017)
2.	Tom Kelly, The Art of Innovation: Lessons in Creativity From IDEO, America's Leading Design Firm (Profile Books, 2002)
3.	Tim Brown, Change by Design: How Design Thinking Transforms Organizations and Inspires Innovation (Harper Business, 2009)
4.	Jeff Dyer, Hal Gregersen, Clayton Christensen, The Innovator's DNA: Mastering the Five Skills of Disruptive Innovators (Harvard Business Review Press, 2009)
5.	Roger Martin, The Design of Business: Why Design Thinking Is The Next Competitive Advantage (Harvard Business Review Press, 2009)
6.	Alexander Osterwalder and Yves Pigneur, Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers (John Wiley and Sons, 2010)
7.	Nigel Cross, Design Thinking: Understanding How Designers Think and Work (Bloomsbury Academic, 2011)
Weblinks: Other useful Design Thinking Frameworks and Methodologies	
1.	Human-Centered Design Toolkit (IDEO); https://www.ideo.com/post/design-kit
2.	Design Thinking Boot Camp Bootleg (Stanford D-School); https://dschool.stanford.edu/resources/the-bootcamp-bootleg
3.	Collective Action Toolkit (Frog Design); https://www.frogdesign.com/wpcontent/uploads/2016/03/CAT_2.0_English.pdf
4.	Design Thinking for Educators (IDEO); https://designthinkingforeducators.com
Mode of Evaluation: Assignment / FAT / Project	

Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	TYPOGRAPHY	L	T	P	J	C
BDE1021		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 01.00				

Course Objectives:

- Explain the History, Classification, Anatomy and Application of typefaces.
- State the Principles of Typographic Design (Expressive Typography. Compositions with type.)
- Demonstrate the importance of Information hierarchy using Grid Systems in Layouts.
- Describe characteristics of well-designed typographic applications in different mediums such as Books, Magazines, New media, Posters, Signage, Motion graphics, Online etc.
- Apply the learnt concepts of typographic design in multiple deliverables (print and online)

Expected Course Outcome:

By the end of the semester students will be able to:

- Recognize and classify type based on form, usage and historical origin.
- Apply to create artefacts based on Typographic design principles in a series of design assignments
- Design and print a multi-page publication that incorporates the purposeful organization of type and image, using industry-standard desktop publishing software.

Module:1		**6 hours**

Introduction to Evolution of Writing, Origin of Letterforms, Historic classification of Typefaces and evolution of styles

Module:2		**6 hours**

Anatomy, Structure and Terminology of Typefaces and their areas of Applications (Key terms pertaining to type design, Strokes and proportion)

Module:3		**3 hours**

Typographic Principles and Elements of Type design (Measuring type/ Type space/Leading/Kerning)

Module:4		**6 hours**

Introduction to Grid Systems in designing layouts for multiple products such as books, magazines, newspaper and website (Choosing the appropriate type based on need, Information hierarchy, Readability, Spacing, Justification)

Module:5		**9 hours**

Expressive typography/ meaningful type/ type and color

Demonstrate ability to form and defend value judgments about graphic design and to communicate art ideas, and concepts.

Typography in designing Brand identities and establish its brand value

Module:6		**9 hours**
Create and develop visual form in response to communication problems, including an understanding of principles of visual organization/ composition, information hierarchy, symbolic representation, typography, aesthetics, and the construction of meaningful messages. Introduction to publication design software Designing Expressive Typographic books for Children		
Module:7		**9 hours**
Describe and respond to the audiences and contexts, which communication solutions must address, including recognition of the physical, cognitive, cultural, and social human factors that shape typographic design decisions Typographic Poster design for Social issue/cause/concerns		
Module:8	Contemporary issues:	**12 hours**
Exploration of three dimensional features of letter forms and types in animation. Designing 3D artefacts using Indian Vernacular typefaces – Multilingual scripts		
	Total Lab hours:	**60 hours**

Text Book(s)

1.	Thinking With Type by Ellen Lupton, Princeton Architectural Press; 2nd Revised edition edition (6 October 2010) ISBN-10: 1568989695 ISBN-13: 978-1568989693
2.	Bringhurst, Robert, The Elements of Typographic Style (Second Edition), **Publisher:** Hartley & Marks Inc.,U.S.; 2nd edition edition (30 September 1996) **ISBN-10:** 0881791326 **ISBN-13:** 978-0881791327
3.	Chapell Warren, The Short History of the Printed World, Publisher: Hartley and Marks Publishers; Revised, Updated, Subsequent edition (June 1, 2000) ISBN-10: 0881791547 ISBN-13: 978-0881791549
4.	Grid Systems in Graphic Design: A Visual Communication Manual for Graphic Designers, Typographers and Three Dimensional Designers by Josef Mülller-Brockmann (Author) **Publisher:** Antique Collectors Club; Bilingual edition (1999) **ISBN-10:** 9783721201451 **ISBN-13:** 978-3721201451
5.	Muller –Brockman, Josef, History of Visual Communication, **Publisher:** Niggli Verlag (January 5, 1999), **ISBN-10:** 3721201884 **ISBN-13:** 978-3721201888
6.	Rehe, Rolf - Typography: How to make it most legible
7	Typographic Design: Form and Communication By Rob Carter, Ben Day, Philip B. Meggs Publisher: John Wiley & Sons; 5th Revised edition edition (2 December 2011) ISBN-10: 047064821X ISBN-13: 978-0470648216
8.	Elam, Kimberly; Expressive Typography. The word as image, John Wiley & Sons Inc (1 December 1989).
9.	Meggs′ History of Graphic Design Hardcover – 20 May 2016 by Philip B. Meggs (Author), Alston W. Purvis (Author) Publisher: John Wiley & Sons; 6th edition (20 May 2016) ISBN-10: 1118772059 ISBN-13: 978-1118772058
10	Typographic Layout and Composition Timothy Samara,
11.	Design Elements : Understanding the Rules and Knowing When to Break Them - Updated and Expanded By (author) Timothy Samara Publication date 15 May 2014 Publisher Rockport Publishers Inc. ISBN10 1592539270 ISBN13 9781592539277

12.	Making and Breaking the Grid: A Graphic Design Layout Workshop by Timothy Samara Published May 1st 2005 by Rockport Publishers (first published January 1st 2003) ISBN 1592531253 (ISBN13: 9781592531257)
Reference Books	
1.	Ruder, Emil; Typography, a manual of Design, Verlag Niggli AG; 7th Revised edition (March 1, 2001)
2.	Gerard Unger: While You're Reading, Mark Batty Publisher (January 2006) ISBN-13: 978-0976224518
3.	Graphic Design Manual : Principles and Practice By (author) Armin Hofmann Publication date 28 Mar 2019 Publisher Niggli Verlag, ISBN10 3721210069 ISBN13 9783721210064
4.	John Kane, Fundamentals of Typography, A Type Primer, Publisher: Laurence King Publishing ISBN: 9781856696449, 9781856696449 Edition: 2011
4.	Jost Hochuli: Detail In Typography, Hyphen; 1 edition (February 27, 2008) ISBN-13: 978-0907259343
5.	Kimberly Elam, Grid Systems: Publisher: Princeton Architectural Press (12 August 2004) ISBN-10: 1568984650 ISBN-13: 978-1568984650
6.	**Rand, Paul** A Designer's art: November 15, 2016, Publisher: Princeton Architectural Press (November 15, 2016) ISBN-10: 9781616894863 ISBN-13: 978-1616894863 Design Form and Chaos December 5, 2017 Publisher: Yale University Press (December 5, 2017) ISBN-10: 0300230915 ISBN-13: 978-0300230918 From Lascaux to Brooklyn : December 5, 2017 Publisher: Yale University Press (December 5, 2017) ISBN-10: 8970591303 ISBN-13: 978-0300230925
7.	https://blog.prototypr.io/50-essential-books-every-graphic-designer-should-read-1c611f77aa5a
Mode of Evaluation: Assignment / FAT / Project	

Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	PACKAGING DESIGN	L	T	P	J	C
BDE1022		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 01.00				

Course Objectives:

1. Seeing in 3D - Learn about foundation types of 3D packaging and important design principles for create effective packages, including product type, composition, visibility, consistency, shape, and audience.

2. Mass vs. Prestige - Explore the design, budgetary, and production choices of designing for mass or prestige audiences. Case studies from beauty and cosmetics industry illustrate how packaging designs communicate value or value-for-money, and exclusivity or accessibility. Take a field trip to identify some mass and prestige packaging as well as study counter animation.

3. Tangible Visual Marketing – Understand the role of target markets in creating packaging designs. Look at how demographics are collected and how to use and go beyond marketing data to target your package designs. Examples and case studies explore how very specific marketing briefs can translate into design choices.

4. Playful Design - A whimsical, fun, or simply unexpected design can attract consumers to your product package and make a memorable statement. Learn how and when to infuse your package designs with playful, lively visuals. Case studies will open your eyes to some of the most fun packaging around.

5. Branding Product Lines - Most products don't just stand alone. Typically, a package design is part of an entire product line which has an established brand and a visual style all of its own. Examine how product lines are branded, expanded, and kept consistent. You will study which components are variable so that each product in the line is unique.
Project - Champagne carton

6. Launching a New Product Design
Apply strategies for making powerful presentations, and the revisions you can expect to make along the way to a packaging design project. In the final project, you will design, present, and "launch" a perfume box and bottle design.

Expected Course Outcome:

By the end of the semester students will be able to:

- Identify the key elements of a packaging composition including placement, product, and audience.
- Identify the production, design, and budgetary differences between mass and prestige packaging designs.
- Develop an understanding of the ways in which marketing research, target audiences, and user profiles affect the packaging design process.
- Develop an understanding of how playful packaging design is created through typography, balance, color, and other attributes..
- Understand and discuss how a product line is developed, updated, and expanded.

Module:1		9 hours

Seeing in 3D, Project – Indian Tiffin/Snacks Take away packages *OR* Fixing School Food: Promoting healthy alternatives among kids.		
Module:2		**9 hours**
Mass Vs Prestige, Project - Mass design (Gas stove) OR GIFT-BOX REUSE: Inventing secondary uses for packages.		
Module:3		**9 hours**
Tangible Visual Marketing , Project – Soft drinks & Beverages		
Module:4		**9 hours**
Playful Design ,Project - Toy packaging OR IN/VISIBLE MESSAGE: Designing a coffee cup sleeve with a secret message?		
Module:5		**9 hours**
Branding Product Lines, Project - Champagne carton OR Packaging Culture: Finding packaging solutions for a multi-cultural gift shop.		
Module:6		**15 hours**
Launching a New Product Design, Project - Cosmetic packaging		
	Total Lab hours:	60 hours

Text Book(s)

1.	Packaging Design; Successful Product Branding from Concept to Shelf by Klimchuk & Krasovec (2012, Second Edition pub Wiley)
2.	The Packaging Designers' Book of Patterns by Lászlo Roth, **Publisher:** Wiley; 4 edition (19 November 2012) **ASIN:** B00AB1T7FC
3.	For Sale: Over 200 Innovative Solutions in Packaging Design By John Foster, **Publisher:** HOW Books (October 6, 2008) **ISBN-10:** 1600610633 **ISBN-13:** 978-1600610639
4.	Paper Folding Templates for Print Design: Formats, Techniques and Design Considerations for Innovative Paper Folding By Trish Witkowski, **Publisher:** HOW Books; Pap/Cdr edition (January 24, 2012) **ISBN-10:** 9781440314124 **ISBN-13:** 978-1440314124 **ASIN:** 1440314128
5.	Best Practices for Graphic Designers: Packaging By Grip, Publisher: Rockport Publishers (December 15, 2013) ISBN-10: 1592538134 ISBN-13: 978-1592538133
6.	Amazing Package Design By Editors of HOW Magazine (Digital Download)
7.	Package Design Workbook: The Art and Science of Successful Packaging by Steven DuPuis (Author), John Silva (Author) Publisher: Rockport Publishers; Reissue edition (June 1, 2011) ISBN-10: 1592537081 ISBN-13: 978-1592537082
8.	Packaging Essentials: 100 Design Principles for Creating Packages (Design Essentials) 1st Edition by Candace Ellicott (Author), Sarah Roncarelli (Author) Publisher: Rockport Publishers; 1 edition (June 1, 2010) ISBN-10: 1592536034 ISBN-13: 978-1592536030
9.	The Package Design Book by Pentawards (Editor), Julius Wiedemann (Editor) Publisher: TASCHEN (November 25, 2017) ISBN-10: 3836555522 ISBN-13: 978-3836555524

References

	Blogs/Websites
1.	Communication Arts _https://www.commarts.com/

2.	Print https://www.printmag.com/
3.	How https://www.howdesignlive.com/
4.	Graphis http://www.graphis.com/
5.	Creative Quarterly https://www.cqjournal.com/
6.	Eye http://www.eyemagazine.com/
7.	Émigré https://www.emigre.com/Magazine
8.	Wired https://www.wired.com/
9.	thedieline.com
10.	lovelypackage.com
11.	packagingserved.com /
12.	ernestpackaging.com/blog
13.	cr8id.com
14.	packagingdesignarchive.org
15.	ambalaj.se bpando.com
16.	underconsideration.com/brandnew/

Mode of Evaluation: Assignment / FAT / Project			
Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	Course title	L	T	P	J	C
BDE1023	PRODUCT SEMIOTICS	2	2	0	0	3
Pre-requisite		Syllabus version				
Nil		v. xx.xx				

Course Objectives

1. To understand the science of signs associated with product design
2. To be able to understand and apply the semantic, syntactic, and pragmatic aspects of design

Course Outcome

Students will have,

1. Ability to understand the meaning of symbols, icons, and indexes
2. Knowledge to analyze the semiotic analysis of products
3. Ability to decipher and manipulate the meanings of product forms
4. Ability to decipher and manipulate the syntactic aspects of product forms
5. Ability to decipher and manipulate the pragmatic aspects of product forms

Module:1	**Introduction to Product Semiotics**	**2 hours**
Overview of the subject and its implications to product design		
Module:2	**Signs**	**4 hours**
Science of signs; Symbols; Icons; Indexes		
Module:3	**Semantic Aspects of Product Forms**	**4 hours**
Meanings of Form; Decoding and Encoding meanings in product design		
Module:4	**Syntactic Aspects of Product Forms**	**4 hours**
Arrangement of visual, emotional, and intellectual elements in a product form		
Module:5	**Pragmatic Aspects of Product Forms**	**4 hours**
Application of different signs on forms; Manipulation techniques of pragmatics		
Module:6	**Semiotic Studies on Products**	**4 hours**
Studies on semantic, syntactic, and pragmatic aspects in product design		
Module:7	**Role of Semiotics in Product Aesthetics**	**6 hours**
Framework of product aesthetics and the aspects of semiotics		
Module:8	**Contemporary Studies**	**2 hours**
Contemporary studies on the Product Semiotics by practicing designers		
	Total Lecture hours:	**30 hours**

Text Book(s)	
1.	Burdek B.E. (2010). Objects: In between language and meaning. MEI (Mediation et Information). ISBN: 978-2-296-11707-5.
Reference Books	
1.	Hekkert P and Schifferstein, (2008). Product Experience. Elsevier, UK and Netherlands.
2.	Lidwell, Holden, Butler [Eds] (2013). Universal Principles of Design, Rockport Publishers, USA and Singapore.
Mode of Evaluation: CAT / Written assignment / Quiz / FAT	

Recommended by Board of Studies	14-9-2020		
Approved by Academic Council	No. 59	Date	24-9-2020

Course code	ORIGAMI	L	T	P	J	C
BDE1024		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

1. To acquaint students with basics of origami.
2. Obtain a knowledge on various hand building techniques using paper.
3. Obtain a knowledge and ability to use the appropriate construction techniques to design using paper.

Expected Course Outcome:

1. To work with paper using various folding techniques.
2. Ability to make models keeping physical and geometric properties of paper and folding.
3. Create modular origami and building large scale structures
4. Ability to work with fractals and tessellations

Module:1		6 hours
History of origami		
Module:2		8 hours
Physical and geometric properties of paper and folding		
Module:3		8 hours
Basic Concepts like dividing the paper, Linear Divisions, Rotational Divisions Grid divisions		
Module:4		8 hours
Symmetrical Repeats: Translation, Reflection, Rotation and Glide Reflection		
Module:5		6 hours
Stretch and Skew, Polygons		
Module:6		10 hours
Basic Pleats: Accordion Pleats, Knife Pleats, Box Pleats, Incremental Pleats, Spiral ,Gathered & twisted Pleats		
Module:7		10 hours
V-Pleats, Spans & Parabolas, Boxes & Bowls and Crumpling techniques		
Module:8	Contemporary issues:	4 hours
Contemporary discussion with the artists and designers.		

	Total Lab hours:	60 hours		
Text Book(s)				
1.	Paul Jackson; Folding Techniques for Designers from Sheet to Form, Laurence King Publishing,2011			
Reference Books				
1.	Robert J.Lang; Origami Design Secrets: Mathematical Methods for an Ancient Art, 2003			
Mode of Evaluation: Assignment / FAT / Project				
Recommended by Board of Studies	27-11-2019			
Approved by Academic Council	57	Date	05-12-2019	

Course code	USER EXPERIENCE DESIGN	L	T	P	J	C
BDE1025		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

In this course, the students will learnt about:

1. What does UX mean?

- User Centred Design history – Evolution of Humans, fulfilling needs through ages by design
- User Experience Design and User Interface Design: Definitions, Roles and Profiles.
- User Centred Design as a process.
- Product design its relevance of UX Design

2. Learn fundamentals of User Centred Design

- The working processes for building a satisfying user experience.
- Focus on niches.
- MVP (Minimum Viable Product).
- Problem solving

3. Understanding Users and their contexts

- Understanding Users – Observations, Recordings, Interviews - Designing Questionnaires, Data Collection,
- Storytelling techniques: storyboarding and product stories.
- Usability – Principles and Guidelines

4. Analyze and Interpret User data

- Analyzing Data (Quantitative & Qualitative),
- Get Insights & Draw Inferences,
- Refine/Reframe problem statement

5. Design Prototypes

- Learn to use industry standard software tools to make interactive prototypes (Low-fidelity and High fidelity using any tool –

6. Conduct Usability Testing

- Testing is a core activity of the UX Designer to evaluate the effective of the designed solution. Introduction to few Usability Testing tools and techniques.

7. Select a great personality and find out about their contributions to the field of User Experience Design.

Expected Course Outcome:

1. Learn the of History of UCD with reference to human evolution.
2. Define User Centred Design Process, Frameworks and apply UCD in a given context.
3. State Usability Principles & Guidelines
4. Ability to conduct User study, Collect pertinent data, Analyze data, formulate insights and inferences into actionable points to design.
5. Acquire proficiency to use software tools for designing solutions and test its effectiveness
6. Possess understanding about various factors influencing ethical values in UCD.
7. Describe the important personalities in UCD and the impact/relevance of their contribution

Module:1	What does User Experience mean?	9 hours

Basic process of user centred design and its history of human evolution from Hunter-Gather, Agriculture – Settlers, tools design & development, Scripts & Writings, Social Systems Structures, Impact of Technology, Industrial Age, Modern Age (WW 1 & 2), Post Cold War, Information Age and Design Futures Collate any period of human evolution, aggregate content pertaining to the selected period to Design a timeline that period to be presented it as well designed "Information Graphic" chart		
Module:2	**Fundamentals of User Centred Design**	**6 hours**
Identify a design need/gap/problem/issue and apply UCD process with details of tasks and activities to be performed in each stage.		
Module:3	**Understanding Users and their contexts**	**9 hours**
Improve user experience in any existing mobile application by conducting evaluation using various methods and techniques. Identify areas to improve end user experience. Propose design enhancements for important tasks/activities as static screen designs.		
Module:4	Analyze User data, Use Insights to Design Prototypes	**18 hours**
Identify a social need/gap/opportunity for an digital application. Demonstrate creation of solution by following UCD process. The final deliverable is to design high fidelity clickable prototype for most critical task flow incorporating Icon, Navigation and Interaction Design elements based on user experience guidelines.		
Module:5	**Conduct Usability Testing**	**6 hours**
Test the effectiveness of the designed solutions using appropriate tools and techniques with the target audience.		
Module:6	Eminent personalities and their contributions in the field of User Experience Design.	**9 hours**
Select on eminent designer and conduct a research about his life, work and its relevance. The findings has to be presented as a concise and engaging well designed presentation in 15 slides		
Module:7	Contemporary issues:	**3 hours**
Expert lecture from Industry sharing insights, best practices and case studies		
	Total Lab hours:	**60 hours**

Text Book(s)

1.	Universal Principles of Design: 100 Ways to Enhance Usability, Influence Perception, Increase Appeal, Make Better Design Decisions, and Teach Through Design by William Lidwell, Jill Butler, Kritina Holden, ISBN: 1592535879, Publisher: Rockport Publishers; Second Edition, Revised and Updated edition (1 January 2010)
2.	The Design of Everyday Things by Donald A. Norman, Publisher: Basic Books; 2 edition (5 November 2013) ISBN-10: 9780465050659 ISBN-13: 978-0465050659
3.	Start with Why: How Great Leaders Inspire Everyone to Take Action by Simon Sinek, Publisher: Penguin UK; Latest Edition edition (6 October 2011) ISBN-10: 9780241958223 ISBN-13: 978-0241958223
4.	Dont make me think by Steve Krug ZHU, Published by Machine Press (2014)

	ISBN 7111184823 (ISBN13: 9787111184829)
5.	Hooked: How to Build Habit-Forming Products by Nir Eyal, Published 2014 by Portfolio ISBN 1591847788 (ISBN13: 9781591847786)
6.	The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses by Eric Ries , Publisher: Currency; 1 edition (13 September 2011) ISBN-10: 9780307887894 ISBN-13: 978-0307887894
7.	100 Things Every Designer Needs to Know about People by Susan M. Weinschenk, Publisher: New Riders; 1 edition (14 April 2011) ISBN-10: 0321767535 ISBN-13: 978-0321767530
8.	**Designing Visual Interfaces: Communication Oriented Techniques (Kevin Mullet),** Published December 5th 1994 by Prentice Hall ISBN 0133033899 (ISBN13: 9780133033892)
9.	**Sprint (Jake Knapp)** Publisher: Simon & Schuster; 1 edition (March 8, 2016) ISBN-10: 150112174X ISBN-13: 978-1501121746
10.	**Rework (Jason Fried and David Heinemeier Hansson),** Publisher: Currency (9 March 2010) ISBN-10: 0307463745 ISBN-13: 978-0307463746
11.	**Creative Confidence (Tom Kelley and David Kelley)** Publisher: Currency (15 October 2013) ISBN-10: 038534936X ISBN-13: 978-0385349369
Reference Books	
1.	Garrett, J. J. (2010). *Elements of user experience, the: user-centered design for the web and beyond*. Pearson Education. Publisher: New Riders; 2 edition (16 December 2010) ISBN-10: 0321683684 ISBN-13: 978-0321683687
2.	Guastello, S. J. (2013). *Human factors engineering and ergonomics: A systems approach*. Publisher: Routledge; 2 edition (December 21, 2013) ISBN-10: 1466560096 ISBN-13: 978-1466560093
3.	Rubin, J., & Chisnell, D. (2008). *Handbook of usability testing: how to plan, design and conduct effective tests*. John Wiley & Sons. 2nd edition (9 May 2008) ISBN-10: 0470185481 ISBN-13: 978-0470185483
4.	Albert, W., & Tullis, T. *Measuring the user experience: collecting, analyzing, and presenting usability metrics*. Publisher: Morgan Kaufmann; 2 edition (July 17, 2013) ISBN-10: 0124157815 ISBN-13: 978-0124157811
5.	Nunes, I. (2012). Ergonomics-A Systems Approach. InTech. Published: April 25th 2012 DOI: 10.5772/2232 ISBN: 978-953-51-0601-2

Mode of Evaluation: Assignment / FAT / Project			
Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	INDIAN SYMBOLOGY	L	T	P	J	C
BDE1026		2	2	0	0	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

1. Semantics & Communication Theory

- Introduction to visual perception and Gestalt laws of organization.
- Introduction to information theory and their application to spatial and spatio-temporal message design.
- Concept of attention in perception.
- Relationship between message design and attention, supported by eye movement studies. Exploring relationships between the semantics and the structure messages.

2. Semiotic basics

- Objects, definition, structure, semiosis
- Signs and their forms Codes and contextual representation.
- Sociology and human needs
- Rituals religion and expression. Art and aesthetics as meaning of expression.
- Meaning making, reproduction of image and technology, post modernism and popular culture.

3. Indian Culture, art and aesthetics through history

- The oriental context emphasis on Indian cultural representations.
- Graphic narratives-Oral Traditions from the ancient to the present.
- Contextual narratives, words and image in storytelling (Gond, Warli, Kalighat Art)
- Oral narrative to pictorial art (Murals and Architecture),
- Form painting to storytelling through pictures(Patua art),
- Narrative sequence, genre, audience, universe and techniques (Graphic novels, Cinema posters)

4. Indian Visual Cultural Images & Symbols

- Images as Signs
- Changing character of Media
- Images and Technology
- 'Looking' at the familiar with unfamiliar eyes
- Communities and Culture Global/Local representation
- Visual Displays
- Symbolism in modern channels of communication

5. Indian Symbolism – Thoughts, Traditions Practices and in Contemporary communications.

- Study on Indian Symbolism as thought and philosophy in the context Art, Music and Architecture.
- Meaning of our festivals, mythology, the nature of religious ceremonies and other cultural diversities.
- Study of various Indian visual symbols.
- Study of Indian patterns and colors.
- Discussion of Indian cultural identity and its modern symbolism interpretation used in

contemporary communications.

• Experiments with designs using both traditional and modern symbols to create a sense of "Indian Identity" a communication artefacts (Installation, Way finding system, Space Design)

Expected Course Outcome:

5. Explore relationships between the semantics and the structure messages.
6. Develop knowledge on Art and aesthetics as meaning of expression
7. Understanding of Symbolism in modern channels of communication
4. Acquire Knowledge on various Indian visual symbols.

Module:1	**Semantics & Communication Theory**	**9 hours**

- Make abstract photographic compositions as typographic elements using Gestalt principles in development of visual messages to design a calendar.

Module:2	**Semiotic basics**	**6 hours**

- Select mundane everyday object from Indian environment for its "symbolic" values in various context of use, such as representation, meanings, interpretation, belief, physical positioning/display.
- Present the findings as an interesting poster (18"X24")

Module:3	**Indian Culture, art and aesthetics through history**	**12 hours**

"Everything is recycled in India, even dreams." ― Shashi Tharoor

- Design a graphic narrative as engaging story (4 A4 pages) incorporating re-symbols using traditional art form (resembles) synthesising with modern images.

Module:4	**Indian Visual Cultural Images & Symbols**	**15 hours**

- "India is the world's largest democracy"
- Make a compilation of all the political parties "symbols" and weave an interesting and compelling narrative as an multimedia statement which symbolises after 72 of Indian Independence

Module:5	**Indian Symbolism – Thoughts, Traditions Practices and in Contemporary communications.**	**18 hours**

- Select any Indian religious ceremony, festival or large celebration. Get to understand the setting, what objects sygnifies, sequence of acts and rituals performed specifying the role of participant and performer.
- Find out the "symbolic" connotation for activities performed based on faith/belief and its relevance/significance to the participants (both from individual perspective and as society)
- Design an 3D installations which symbolically represents the subject.

	Total Lab hours:	**60 hours**

Text Book(s)

1.	Moving Focus: Essays on Indian Art, by K. G Subramanyan. **Publisher:** Seagull Books; Edition edition (2006) **ISBN-10:** 8187507144 **ISBN-13:** 978-8170463085
2.	Indian Art/Bharatiya Kala by Agrawal, V.S. **ISBN-10:** 9351460010 **ISBN-13:** 978-9351460015
3.	Hindu View of Art by Ananad, Mulkraj, Publisher – Allen & Unwin, 1933

	Indian Sculpture: Circa 500 B.C.-A.D. 700 Authors Los Angeles County Museum of Art, Pratapaditya Pal Publisher University of California Press, 1986 ISBN 0520059913, 9780520059917
4.	Early Indian Sculpture, 2 vols by Bachoffer, L. **Publisher:** Hacker Art Books; Facsimile edition edition (1 March 1975) **ISBN-10:** 0878170588 **ISBN-13:** 978-0878170586
5.	Development of Hindu Iconography by Banerjee, J.N. **Publisher:** Munshiram Manoharlal Publishers; 3rd Rev edition (30 November 1956) **ISBN-10:** 8121500699 **ISBN-13:** 978-8121500692
6.	History of Indian and Indonesian Art by Coomarswamy, A.K, Publisher Dover Publications, 1985, ISBN 0486250059, 9780486250052
7.	Indian Sculpture by Kramrisch, Stella, **Publisher:** Motilal Banarsidass,; Second Reprint edition (1 March 2013) **ISBN-10:** 8120836146 **ISBN-13:** 978-8120836143
8.	Indian Art by Mitter, Partha, Published July 19th 2001 by Oxford University Press, USA **ISBN**0192842218 (ISBN13: 9780192842213)
9.	Comparative Aesthetics Vol. 1: Indian Aesthetics Vol. 2: Western Aesthetics by Pandey, K.C. **Publisher:** CHOWKHAMBA SANSKRIT SERIES OFFICE VARANASI; FORTH & THIRD edition (2015) **ISBN-10:** 8170804450 **ISBN-13:** 978-8170804451
10.	South Indian Bronzes by Shivramamurti, C. **Publisher:** Lalit Kala Akademi (1981) **ASIN:** B0042LU0KI
11.	Natya Sastra by Vatsyayan , K. **Publisher:** Sahitya Akademi (31 December 2007) **ASIN:** B004AQ9QXM
12.	The Living Tradition, by K. G Subramanyan. Seagull Books Pvt.Ltd, (1 April 1987) **ISBN-10:** 8170460220 **ISBN-13:** 978-8170460220
13.	Iyer Bharatha K; Indian art-A short introduction, Publisher Taraporwala, Mumbai, 1982
14.	Boner, Sharma Baumer; Vastusutra Upanishad, Motilal Banarasides, Delhi, 1982
15.	Speaking with pictures: folk art and the narrative Tradition in India by Roma Chatterjee . , **Publisher:** Routledge India; 1 edition (12 June 2012) **ISBN-10:** 041552301X **ISBN-13:** 978-0415523011
16.	Smith, Marquard, 'Visual Culture Studies: Questions of History, Theory, and Practice' in Jones, Amelia (ed.) A Companion to Contemporary Art Since 1945, Oxford: Blackwell, 2006. ISBN 9781405135429
17.	Sturken, Marita; Lisa Cartwright (2007). Practices of Looking: An Introduction to Visual Culture, 2nd ed., Oxford: Oxford University Press. ISBN 0-19-531440-9.
18.	Lal, Vinay & Nandy, Ashis (Eds.), Fingerprinting Popular Culture : The Mythic and the Iconic in Indian Cinema, 2006 ISBN : 0195679180
19.	Richards, Asha; Pop Culture India!: Media, Arts, and Lifestyle (Popular Culture in the Contemporary World): ABC-CLI O, 2006 I SBN-10: 1851096361 I SBN-13: 978-1851096367
20.	Dikovitskaya, Margaret; Visual Culture: The Study of the Visual after the Cultural Turn, 1st Ed., Cambridge, Ma: The MIT Press, (2005 (cloth), 2006 (paperback)), ISBN 0-262-04224-X.
Reference Books	
1.	Crary, Jonathan; Techniques of the Observer: On Vision and Modernity in the 19th Century, Publisher: The MI T Press; Reprint edition, 1992
2.	Fuery, Kelli & Patrick Fuery (2003). Visual Culture and Critical Theory, 1st ed., London: Arnold Publisher. ISBN 0340807482.
3.	Jay, Martin (ed.), 'The State of Visual Culture Studies', themed issue of Journal of Visual Culture, vol.4, no.2, August 2005, London: Sage. ISSN 14704129. eISSN 17412994
4.	Sign an introduction to Semiotics bt Thomas A Sebeok. University of Toronto press
5.	The Basic Semiotics by Daniel Chandler. **Publisher:** Routledge; 2 edition (9 January 2007)

	ISBN-10: 0415363756 **ISBN-13:** 978-0415363754
6.	Analysing Discourse: Textual Analysis for Social Research, by Norm, **Publisher:** Routledge (July 18, 2003) **ISBN-10:** 0415258936 **ISBN-13:** 978-0415258937
7.	Mirzoeff, Nicholas (ed.) (2002). The Visual Culture Reader, 2nd ed., London: Routledge. ISBN 0-415-25222-9.
8.	Morra, Joanne & Smith, Marquard (eds.) (2006). Visual Culture: Critical Concepts in Media and Cultural Studies, 4 vols. London: Routledge. ISBN 0-41-532641-9.
9.	Visual Communication: more than meets the eye by Harry Jamieson. Intellect Books UK
10.	Plate, S. Brent, Religion, Art, and Visual Culture. (New York: Palgrave Macmillan, 2002) ISBN 0-312-24029-5
11.	Practices of Looking: an introduction to visual culture by Marita Sturken & Lisa Cartwright. **Publisher:** Oxford University Press; 2 edition (January 2, 2009) **ISBN-10:** 0195314409 **ISBN-13:** 978-0195314403
12.	Colour and meaning: art, science and Symbolism, by John Gage. Publisher University of California Press, 1999 ISBN 0520226119, 9780520226111

Mode of Evaluation: Assignment / FAT / Project			
Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	INTERACTION DESIGN	L	T	P	J	C
BDE1027		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

In this course, the students will learn about:

1. Learn essentials of interaction design
2. Understand principles of interactive system design
3. Explain importance of goal directed interaction design
4. Describe different interface design guidelines and their application for creating interactions

Expected Course Outcome:

At the end of this course students will be able to,

1. Explain the fundamentals of Interaction Design (ID): Definition of ID; Types of Interactions; Goal-Directed Design Principles
2. Explain the Principles of Interface Design, Navigation design and Interaction design.
3. Ability to apply design process of Human-Centred Interactive systems
4. Possess knowledge of PACT: A framework for designing interactive systems and demonstrate its application as case study
5. State Experience design guidelines
6. Proficient in use of software tools to Create, Build and Test the designed prototypes to check its effectiveness.

Module:1	Essentials of interaction design	9 hours

Select a suitable a product (Tangible /Digital Product) to explain the application of Principles and Types of Interactions incorporated. Analyse and Present findings/observations with recommendations to improve end user experience..

Module:2	Understand principles of interactive system design	9 hours

Identify one Indian Government website/portal and check effectiveness by conducting a Usability Evaluation of Interaction Design Principles (Visibility, Feedback, Constraint, Mapping Consistency, and Affordance). Propose interaction design enhancements as interactive screens for tasks/functions.

Module:3	Explain importance of goal directed interaction design	9 hours

Improve user experience in any of mobile application by redesigning the micro-interactions

Module:4	Describe interface design guidelines and their application	9 hours

Application of PACT framework on a selected topic as a case study

Module:5	**Design an digital application**	**24 hours**
Identify a need/gap for a digital application for a social need and design high fidelity prototype for most critical task flow incorporating Icon, Navigation and Interaction Design elements based on user experience guidelines.		
	Total Lab hours:	**60 hours**

Text Book(s)	
1.	Mobile Interaction Design by Matt Jones and Gary Marsden, Publisher: Wiley; 1 edition (February 3, 2006) ISBN-13: 978-0470090893 ISBN-10: 0470090898
2.	Preece, Rogers and Sharp, Interaction Design: Beyond Human–Computer Interaction, John Wiley and Sons, Delhi, 2003.
3.	Shneiderman, Designing the User Interface: Strategies for Effective Human-Computer Interaction, (3rd Ed.), Addison Wesley, 2000.
4.	Andrew Sears, Julie A. Jacko The Human-Computer Interaction Handbook: Fundamentals, Evolving Technologies, New York: John Wiley & Sons, 2002.
5.	Cooper, A., Reimann, R., Cronin, D., & Noessel, C. (2014). *About face: the essentials of interaction design*. John Wiley & Sons.
6.	Benyon, D., Turner, P., & Turner, S. (2005). *Designing interactive systems: People, activities, contexts, technologies*. Pearson Education.

Reference Books	
1.	Benyon, D. (2010). Designing interactive systems: a comprehensive guide to HCI and interaction design . Pearson Education.
2.	Albert, W., & Tullis, T. (2013). Measuring the user experience: collecting, analyzing, and presenting usability metrics. Newnes.
3.	Don Norman 1988 The design of everyday things Publisher: Basic Books; Revised edition (November 5, 2013) ISBN-10: 9780465050659 ISBN-13: 978-0465050659
4.	Designing for Interaction – Dan Safer, New Riders; 2 edition (25 September 2009) (ISBN 0321643399)
5.	About Face 3: The Essentials of Interaction Design, Alan Cooper, Robert Reimann, David Cronin, Publisher: John Wiley & Sons; 4th edition (19 September 2014) ISBN-10: 1118766571 ISBN-13: 978-1118766576

Reference Websites	
1.	uie.com*:* *http://www.uie.com/articles/subtle_interaction_design/*
2.	askTog.com*:* *http://www.asktog.com/basics/firstPrinciples.html*
3.	UXMatters*:* *http://www.uxmatters.com/mt/archives/2008/10/selling-ux.php*
4.	Google*:* *http://www.google.com/corporate/tenthings.html*
5.	The Standish Group: *http://www.standishgroup.com/sample_research/index.php*
6.	Forrester: *http://www.forrester.com/ER/Research/Report/Summary/0,1338,8734,FF.html*
7.	Usability: http://www.useit.com

Mode of Evaluation: Assignment / FAT / Project

Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	SERVICE DESIGN	L	T	P	J	C
BDE1028		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

In this course, the students will learn about:

1. Understand the concept of Services in a networked society – Evolution & Present day context
2. Examine the essentials of Service Design, "Design is Invisible"
3. Learn about Service Design and Operation Lifecycle
4. Know the relevant design method for developing services
5. Understand the design process - Overview of the Double Diamond process
6. Demonstrate understanding of Tools and Methods for Service Design:
   - Discover - User Journey Mapping, User Diaries, Service Safari, User Shadowing,
   - Define – User Personas, Ideating and articulating a Design Brief
   - Develop – Service Blue printing, Experience prototyping, Business Model canvas
   - Deliver - Scenarios

Expected Learning Outcomes:

1. Explain the concept of Services in a networked society – Evolution & Present day context
2. State the fundamentals of Service Design,
3. Describe various aspects of Service Design and its Operation Lifecycle
4. Explain the need for a design method for developing services
5. Build a Service Design intervention using double diamond process
6. Demonstrate understanding of Tools and Methods for Service Design
7. Present a detailed Service Design proposal using all the learnt knowledge

Module:1		**9 hours**
Understand the concept of Services in a networked society – Evolution & Present day context		
Module:2		**6 hours**
Examine the essentials of Service Design, "Design is Invisible"		
Module:3		**12 hours**
Learn about Service Design and Operation Lifecycle		
Module:4		**3 hours**
Know the relevant design method for developing services		
Module:5		**5 hours**
Understand the design process - Overview of the double diamond phases		
Module:6		**25 hours**
Demonstrate understanding of Tools and Methods for Service Design		

	Total Lab hours:	**60 hours**

Text Book(s)	
1.	Norman, D. 2011. Living with Complexity. Cambridge, MA: The MIT Press.
2.	This is Service Design Thinking. Published in 2010 by BIS Publishers ISBN 978-90-6369-256-8
3.	Design methods for developing services – an introduction to service design and a selection of service design tools, Publisher Routledge, 2016 ISBN 1317181743, 9781317181743
4.	Service Design Tools. 2010. Retrieved June 1, 2010: servicedesigntools.org
5.	Nielsen, J. 2005. Heuristic evaluation. Retrieved June 10, 2011 from: www.useit.com/papers/heuristic/
6.	Glushko, R. 2010. Seven Contexts for Service System Design. (ischool.berkekey.edu/glushko)
7.	Ricketts, J. 2008. Reaching the Goal: How Managers Improve a Service Business Using Goldratt's Theory of Constraints. Upper Saddle River, NJ: IBM Press/Pearson PLC.
Reference Books	
1.	Moritz, S. 2005. Service design – Practical access to an evolving world. Köln International School of Design (KISD), Köln, Germany.
2.	Bruce, M., Bessant, J. Design in business: Strategic innovation through design. Design Council, UK. (2002)
3.	Experience Design Board: A tool for visualizing and designing experience-centric service delivery processes – Chiehyeon Lim, Kwang-Jae Kim, https://doi.org/10.1016/j.jretconser.2018.07.021
4.	Ferrario, R. and N. Guardino. 2008. Towards an Ontological Foundation for Services Science. Proceedings of the Future Internet Symposium, Vienna Austria, 28-30 September 2008.
5.	Verganti, R. 2009, Design Driven Innovation, Harvard Business Press, Boston
6.	Handy, C. 1995, The Gods of Management: The Changing Work of Organisations, Random House, London
7.	Zeithaml, V. A., Parasuraman, A., Berry, L. L. Delivering Service Quality: Balancing Customer Perceptions and Expectations. The Free Press, 1990
8.	Edman, K. W. (2009, November) Exploring overlaps and differences in service-dominant logic and design thinking. Paper presented at the 1st Nordic Conference on Service Design and Service Innovation, Oslo, Norway.
Other References	
1.	Australian Government 2012, Australia in the Asian Century, Australian Government, http://asiancentury.dpmc.gov.au/white-paper
2.	Service Design Network. 2010. Retrieved June 1, 2010: www.service-designnetwork.org/frontpage-com 4
3.	Shostack, L. "Designing Services That Deliver," Harvard Business Review, January-February, 133-9. (1984)
4.	Service Design Network. Service design network manifesto. Unpublished. (2005).
5.	Patricio, L, Fisk, R. P., & Cunha, J. F. (2008). Designing multi-interface service experiences: The service experience blueprint. Journal of Service Research, 10(4), 318-334.
6.	Pinhanez, C. (2009). Services as customer-intensive systems. Design Issues, 25(2), 3-13.
7.	Sangiorgi, D., & Clark, B. (2004, July 28). Towards a participatory design approach to service design. Paper presented at the 8th Biennial Participatory Design Conference, Toronto, Canada.

Mode of Evaluation: Assignment / FAT / Project			
Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	GAME DESIGN	L	T	P	J	C
BDE 1029		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

1. To Identify the fundamental concepts and key issues of the Game development discipline.
2. To gain knowledge to create game for various platforms.
3. To Articulate a clear and comprehensive game structure which is verified during game development.

Expected Course Outcome:

At the end of course, students should be able to,

- Differentiate the tools and techniques involved in creating 2D & 3D games.
- Identify and apply suitable methods to create games for various platforms.
- Design and conduct experiments to address problems germane to the discipline.
- Ability to understand current and future trends in gaming industry.
- Integrate 2D & 3D assets in to Game Engines to publish Games.

Module:1		6 hours
Game Design – an introduction (Game Theory, Detailed Design Docs, Storytelling, Visual Storytelling, Critical Game Analysis) . Various Genres of Games		
Module:2		8 hours
Board games, Various platforms in games and their differences		
Module:3		8 hours
Game Art and a comparison with Art asset creation for animation		
Module:4		8 hours
Game Art production techniques and technologies involved for game development (a study on various game engines)		
Module:5		6 hours
A detailed look at a 3D game engine		
Module:6		10 hours
Game Design Documents and Technical Design Document . Level , Sound, UI Design		
Module:7		10 hours
Production pipelines in game production . The gaming industry, Producing and Distribution . Making a playable level.		
Module:8	Contemporary issues:	4 hours

Contemporary discussion with the artists and designers.				
	Total Lab hours:	60 hours		
Text Book(s)				
1.	T Leo Hartas and Dave Morris, The Graphic Art of Computer Games, WatsonTGuptill, 2003			
2.	Chris Crawford, Game Design, New Riders, 2003			
3.	Katie Salen and Eric Zimmerman, Rules of Play: Game Design Fundamentals, The MIT Press, 2003			
4.	Josh Jenisch, The Art of the Video Game by, Quirk Books, 2008			
Reference Books				
1.	Jeannie Novak and Travis Castillo, Game Development Essentials: Game Level Design, Delmar Cengage Learning, 2008			
2.	Flint Dille and John Zuur Platten, The Ultimate Guide to Video Game Writing and Design, Lone Eagle, 2008			
Mode of Evaluation: Assignment / FAT / Project				
Recommended by Board of Studies		27-11-2019		
Approved by Academic Council		57	Date	05-12-2019

Course code	SYSTEMS DESIGN	L	T	P	J	C
BDE1030		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

In this course, the students will learn about:

1. What is and why use a Systems Approach to Systems Design
   - Emergence – desirable and undesirable
   - Systems Thinking
     - Purpose and Context
     - System Boundary
     - Subsystems and super-systems
     - Events, patterns and behaviour
2. Relate Systems Thinking in systems design
3. Demonstrate designing in levels and the V diagram Generic system design process
4. Explain a Systems Approach to Determining Requirements
5. How to perform Gathering Requirements
   - Process for gathering requirements
   - Requirements Elicitation Plan
   - Stakeholder Analysis using the Stakeholder Map
   - Eliciting and Capturing Requirements
     - Affinity Diagrams
     - Use Cases
     - Tree Diagram
6. Analysing Requirements
   - Understanding Requirements
   - Holistic Requirements Model
   - Process for Analysing Requirements
   - Tools for Analysing Requirements
     - Need Means Analysis
     - Viewpoint Analysis
     - Functional Modelling
7. Show a Systems Approach to Systems Design
   - Technology and Architecture considerations
8. Build System Architecture
   - Principles of System Architecting
   - Logical System Architecting
   - N2 Analysis
   - Interface considerations
9. Generating technological solutions
   - Function Means Analysis
   - Down-selection
10. Systems Concept evaluation and selection
    - Decision Matrix
    - Pugh Matrix

Expected Learning Outcomes:		
At the end of this course the students participants will: • Have an understanding the principles of systems thinking and how it applies to the creation of a new system through the appropriate blend of people, process and tools • Understand the critical role of requirements in engineering • Identify system stakeholders and gather their requirements • Analyse stakeholder requirements and translate these into specific, precise and measurable technical system requirements • Generate and down-select alternative system design concepts and architectures. • Consider the impact on future business of adopting a systems approach to systems design.		
Module:1		**3 hours**
What is and why use a Systems Approach to Systems Design		
Module:2		**3 hours**
Relate Systems Thinking in systems design		
Module:3		**3 hours**
Demonstrate designing in levels and the V diagram Generic system design process		
Module:4		**3 hours**
Explain a Systems Approach to Determining Requirements		
Module:5		**6 hours**
How to perform Gathering Requirements		
Module:6		**9 hours**
Analysing Requirements		
Module:7		**3 hours**
Show a Systems Approach to Systems Design		
Module:8		**9 hours**
Build System Architecture		
Module:9		**9 hours**
Generating technological solutions		
Module:10		**12 hours**
Systems Concept evaluation and selection		
	Total Lab hours:	**60 hours**
Text Book(s)		

1.	Armson, R. (2011). Growing wings on the way: Systems thinking for messy situations. Axminster, UK: Triarchy Press.
2.	Brown, T. Change by Design. Harper Business, New York, USA. **Publisher:** HarperBusiness (September 29, 2009) **ISBN-10:** 9780061766084 **ISBN-13:** 978-0061766084
3.	Checkland, P. (1981), Systems Thinking, Systems Practice. John Wiley & Sons, West Sussex, England, UK. Checkland, P. and Scholes, J. (1999), Soft Systems Methodology in Action. John Wiley & Sons, West Sussex, England, UK.
4.	Davidz, H., Nightingale, D., and Rhodes, D, (2005), "Enablers and Barriers to Systems Thinking Development: Results of a Qualitative and Quantitative Study," 3rd Conference on Systems Engineering Research, Hoboken, NJ, USA.
5.	Jones, J. C. (1970). Design methods: Seeds of human futures. London: Wiley-Interscience. ISBN-10: 0471447900 ISBN-13: 978-0471447900
6.	Patel, S. and Mehta, K. (2016), "Systems, Design, and Entrepreneurial Thinking: Comparative Frameworks." Systemic Practice and Action Research.
7.	Midgley, G. (Ed.). (2003). Systems thinking, Volumes 1-4. London: Sage **ISBN-10:** 0761949593 **ISBN-13:** 978-0761949596
8.	Sevaldson, B. (2011). GIGA-Mapping: Visualisation for complexity and systems thinking in design. Nordes, (4).Retrieved January 15, 2014, from http://ocs.sfu.ca/nordes/index.php/nordes/2011/paper/view/409/256.
9.	Sanders, E. B.-N.,E. Brandt and T. Binder (2010). A Framework for Organizing the Tools and Techniques of Participatory Design. In: Proceedings of the 11th Biennial Participatory Design Conference, p.195-198. sydney, Australia: ACM
10.	Jordan, P.W., Designing Pleasurable Products; An Introduction to the New Human Factors, **Publisher:** Routledge; 1 edition (August 24, 2002) **ISBN-10:** 0415298873
Reference Books	
1.	K. T. Ulrich and Steven D. Eppinger, Product Design and Development (New York: McGraw-Hill, 2000).
	Kelley, T., & Littman, J. (2008). The ten faces of innovation: IDEO's strategies for beating the devil's advocate & driving creativity throughout your organization. London: Profile.
2.	Brooks, F.P., The Design of Design, Turing Award Lecture, http://terra.cs.nps.navy.mil/DistanceEducation/online.sig graph.org/2001/SpecialSessions/2000TuringLectureDesignOfDesign/session.html, 2000
3.	Simonsen, J. & Robertson, T. (2012).Routledge International Handbook of Participatory Design. London: Taylor & Francis.
4.	Greene, M.T. and Papalambros, P.Y. (2016). “A Cognitive Framework for Engineering Systems Thinking.” Conference on Systems Engineering Research (CSER), March 22-24, 2016, Huntsville, AL, USA
5.	McGowan, AM, Bakula, C., and Castner, R. (2017), “Lessons Learned from Applying Design Thinking in a NASA Rapid Design Study in Aeronautics.” Proceedings of AIAA SciTech 2017, Grapevine, FL, Jan 9-13.
6.	Ulrich, W. (1983). Critical heuristics of social planning: A new approach to practical philosophy. Bern: P. Haupt.
7.	Plattner, H., Meinel, C., and Leifer, L. (2011), Design Thinking: Understand, Improve, Apply. Springer, Verlag Berlin Heidelberg.
8.	Plattner, H., Meinel, C., and Leifer, L. (2014), Design Thinking Research: Building Innovation Ecosystems. Springer Switzerland.
9.	von Bertalanffy, L. (1956). General System Theory. General Systems, 1, 1–10.
10.	VanPatter, G. K., & Pastor, E. (2013). Innovation methods mapping. New York: Humantific

	for OPEN Innovation Consortium.		
Mode of Evaluation: Assignment / FAT / Project			
Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	EXHIBITION DESIGN	L	T	P	J	C
BDE1031		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

In this course, the students will learn about:

1. Examine the role that exhibition design plays in communicating knowledge through history
2. Approaches to Exhibit Design (Subject Matter, Aesthetic, and Hedonistic i.e. engaged in the pursuit of pleasure; sensually self-indulgent.)
3. Exploration of display methods within the language of exhibits by Developing an exhibition storyline
4. Learn about various elements of process like space, function, materials, detailing and execution.
5. Explore various structural systems, forms and material possibilities in Exhibition design.
6. Perform Design ideation – Exhibition planning, Display, Visual Design, Interactions and installation for a variety of purposes.

Expected Course Outcome:

At the end of this course students will be able to:

1. Analyze information from a wide range of sources to develop a detailed exhibition proposal for an identified audience / public venue.
2. Apply information on the audience(s) for a proposed public exhibition venue to develop an exhibition proposal.
3. Planning the layout and design of an exhibition
4. Report the key narratives / atmosphere / mood of an exhibition proposal to an identified audience.
5. Synthesize information from a wide range of sources to identify key artefacts and information, and to develop a series of key story lines / narratives for an exhibition proposal.
6. Evaluate ways in which exhibition practice can be more sustainable and apply those principles to an exhibition proposal.

Module:1		3 hours
Introduction: Elements of an Exhibition		
Module:2		3 hours
History of exhibition display		
Module:3		3 hours
Anatomy of Exhibition		
Module:4		3 hours
Designing exhibition: Basic approaches		
Module:5		3 hours

Lighting, environmental control and security			
Module:6		3 hours	
Crating, mounting and installation			
Module:7		6 hours	
Exhibition Design interpretation and case studies			
Module:8		15 hours	
Visit a museum or an exhibition and analyze its existing design by proposing a enhanced alternative			
Module:9		21 hours	
Design an complete exhibition from identifying and selecting a topic, creating its design brief, construct its theme and presentation, make a model/mock up for presentation with photographs/videos			
	Total Lab hours:	**60 hours**	

Text Book(s)

1.	Exhibition design / Philip Hughes. London: Laurence King, 2010.
2.	Creating exhibitions : collaboration in the planning, development, and design of innovative experiences / Polly McKenna-Cress, Janet A. Kamien.Hoboken, New Jersey : Wiley, [2013]
	Wayshowing: a guide to environmental signage; principles & practices / Per Mollerup. Baden: Lars Müller, 2005.
3.	Light and Emotions: Exploring Lighting Cultures / Conversations with Lighting Designers / edited by Vincent Laganier & Jasmine van der Pol Published by Birkhauser, GmbH, Basel, 2011
4.	Made to Stick by Dan and Chip Heath. **Publisher:** Random House; 1st edition (January 2, 2007) **ISBN-10:** 1400064287
5.	Exhibition Design by David Dernie Publisher: W. W. Norton & Company (September 17, 2006) ISBN-10: 0393732118 ISBN-13: 978-0393732115
6.	Exhibitions: Concept, Planning and Design by Tom Klobe Publisher: American Alliance Of Museums (April 20, 2012) ISBN-10: 193325369X ISBN-13: 978-1933253695
7.	Exhibition Design: An Introduction Philip Hughes Publisher: Laurence King Publishing; 2 edition (September 8, 2015) ISBN-10: 1780676069 ISBN-13: 978-178067606
8.	Brian O'Doherty, Inside the White Cube: The Ideology of the Gallery Space Publisher: University of California Press; Expanded edition (January 14, 2000) ISBN-10: 0520220404 ISBN-13: 978-0520220409
9.	Leonard Koren, Arranging Things: A Rhetoric of Object Placement (Stone Bridge Press:Berkeley) 2003 ISBN-10: 1880656825 ISBN-13: 978-1880656822
10.	Hodgetts + Fung: Scenarios and Spaces, "Experience and Scenario," (Rizzoli) 1997 ISBN 0847818136
11.	Material World 2: Innovative Materials for Architecture and Design (Birkhaüser: Basel, Boston, Berlin) 2 Publisher: Birkhauser; 1 edition (January 3, 2007) ISBN-10: 3764372796

Reference Books

1.	The power of display : a history of exhibition installations at the Museum of Modern Art / Mary Anne Staniszewski. Cambridge, Mass. : MIT Press, c1998. **ISBN-10:** 0262194023
2.	What makes a great exhibition? / Paula Marincola, editor. Philadelphia, PA : Philadelphia Exhibitions Initiative, Philadelphia Center for Arts and Heritage ; Chicago, IL : Distributed for Reaktion Books in the USA and Canada by the University of Chicago Press, c2006.
3.	The manual of museum exhibitions / edited by Barry Lord and Gail Dexter Lord. Walnut Creek, CA : AltaMira Press, c2002.
4.	Museums in motion: an introduction to the history and functions of museums / Edward P. Alexander and Mary Alexander. Lanham: AltaMira Press, c2008.
5.	New media in the white cube and beyond: curatorial models for digital art / edited by Christiane Paul. Berkeley: University of California Press, c2008.
6.	Herzog & de Meuron: natural history / edited by Philip Ursprung. Montréal: Canadian Centre for Architecture; [Baden, Switzerland] : Lars Müller, 2002, c2005.
7.	Art and artifact: the museum as medium / James Putnam. New York, N.Y. : Thames & Hudson, c2001.

Mode of Evaluation: CAT / Assignment / FAT / Project

Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	APPLIED ERGONOMICS	L	T	P	J	C
BDE2004		2	0	2	0	3
Pre-requisite		Syllabus version				
BDE1004	Fundamentals of Ergonomics	v.2.0				

Course Objectives:

The students will be able to,

1. Implement ergonomic principles to optimize human well-being and overall performance.
2. Analyse and implement solutions to a human factor problem.
3. Understand the impact of human factors in workplace design-environment and Productivity.

Expected Course Outcome:

The students will have,

1. Ability to consider human factors and limitations in designing consumer/industrial products, workplaces and work environment.
2. Understanding the concepts of applied anthropometry, workplace design and the ergonomics aspects in various environmental conditions.
3. Ability to apply human factors in various environments and considering human factors in human errors & accidents.
4. Ability to perform ergonomic analysis in virtual environment.
5. Understanding the ergonomic principles in digital interfaces.

Module:1		2 hours
Human centric Design of service/system. Selection of action in single/ multi task performance. Motor control of action – co-ordination of action, sequencing and timing of action- Reaction time.		
Module:2		4 hours
Anthropometry for Product and Workspace Design. Decision making models, decision support and problem solving. Mental workload and situation awareness.		
Module:3		4 hours
Factors in Organisational design and management – situation awareness. Affective engineering and design with respect to Workplace Design. Role of Illumination, Noise, Vibration, and Motion.		
Module:4		6 hours
Management low back disorder in Workplace -MSD. Warning and Hazards communications. Use of personal protective equipment in workplace. Human error and reliability analysis		
Module:5		4 hours
Digital Human simulation in Design and virtual environment. Accident and Incident investigation. Cost Benefit Analysis in Human-system Investments. Methods for evaluations outcomes.		
Module:6		4 hours
Visual Displays – Information visualization. Human factors in Online communications and social		

computing. Usability testing – UX and UI perspectives. Website design and evaluation. Human Factors in ambience intelligence environments. Interactivity – Evolution and emerging tools.		
Module:7	Applications of Human factors and Ergonomics	4 hours
Design for people with functional limitations, Aged and Children. Design for All: Computer assisted design of user interface. HFE in Manufacturing, Healthcare, Transport, Automation Design, and Aviation.		
Module:8	Contemporary issues:	2 hours
Contemporary discussion with the artists and designers.		
	Total Lab hours:	30 hours

List of Experiments (Indicative)

1. Ergonomic analysis of Manual Material Handling equipment.
2. Workspace design and seating, arrangement of components within a physical space.
3. Design of repetitive task, design of manual handling task.
4. Ergonomic analysis of Controls and data entry devices.
5. Illumination, climate, noise, motion, sound, vibration.
6. Human error, accidents, human factors and the automobile.
7. Organizational and social aspects.
8. Virtual environments.

Text Book(s)

1.	J. Bridger R S, "Introduction to Ergonomics", Taylor and Francis, London, 2013.

Reference Books

1.	Mark S Sanders, "Human Factors in Engineering and Design", McGraw Hill, New York, 1993.
2.	G. Karl Kroemer, Henrike Kroemer, Katrin Kroemer-Elbert, "ERGONOMICS" How to Design for Ease & Efficiency, Prentice Hall International Editions, 2001.

Mode of Evaluation: Assignment / FAT / Project

Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	ELECTRONIC PRODUCT DESIGN	L	T	P	J	C
BDE1005		0	0	4	4	3
Pre-requisite	PHY1004	Syllabus version				
		v. 1.0				

Course Objectives:

1. To implement the foundational knowledge of electronics
2. To understand the principles of electronic circuits through experimental learning.
3. Ability to impart electronics knowledge in product designs.

Expected Course Outcome:

The students will have,

1. Knowledge of electric and electronic basics.
2. Basic knowledge in electronic components and properties.
3. Understanding circuits and theorems.
4. Knowledge of dynamic circuits.
5. Knowledge of semiconductors.
6. Knowledge of sensors, actuators, etc.,

Module:1	Introduction to electricity	8 hours	

Electrons, electric current, conductors, insulator; cells & batteries, sources of power – chemical, solar, mains; current, voltage and power, power equations, Direct Current, Alternating Current; electrical circuits, pulses, waves, signals and noise.

Module:2	Introduction to basic electronic components and properties	8 hours	

Resistance/resistor, capacitance/capacitor, Inductance/inductor, Batteries, voltage and current sources, wires and cables, switches, transducers – potentiometers & temperature sensors, fuses, Ohms law, voltmeters, ammeters

Module:3	Introduction to Resistive Circuits	8 hours	

Resistive circuits, Kirchoff's laws, series, parallel, series-parallel circuits, voltage/current dividers, analysis of resistive circuits – node voltage, mesh current,

Circuit theorems – Source Transformations, Superposition, Thevenin's Theorem, Norton's Equivalent Circuit, Maximum Power Transfer

Module:4	Introduction to Dynamic Circuits	8 hours	

Energy storage in capacitors/inductors, Series and parallel capacitors/inductors, Linear (First-order) RC, RL Circuits, Response and time constants.

Module:5	Semiconductors	8 hours	

Introduction to Discrete Semiconductors: Single Junction – Diode, Uni-junction Transistor, Multi Junction – Bipolar Transistor, Field Effect Transistor, MOSFET, Thyristors - SCR, Triacs

Introduction to Photonic Semiconductors: Light and optics, LEDs, Light detectors – Photo resistive, PN Junction – photodiodes, phototransistors, photodiodes thyristors; Solar Cells,

Module:6	**Introduction to Integrated Circuits**	**8 hours**	

Analog - Op-amp, voltage regulator, timer, multiplexer, comparators;
Digital - Logic gate, flip flop, shift register, counter, encoder, decoder; Analog to Digital A/D, Digital to Analog D/A Conversions.

Module:7	**Introduction to basic sensors, actuators and motors**	**8 hours**	

IR, Light, Touch, Temperature, Reed, Tilt, etc., Linear and rotational actuators, Mechanical actuators, Piezoelectric actuators, etc., DC motor, stepper motor, servo motor, AC motors, Introduction to PCBs

Module:8	**Contemporary issues:**	**4 hours**	

Contemporary discussion with industry experts.

	Total Lecture hours:	**60 hours**	

Text Book(s)

1.	Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuits Theory", 11e, Pearson India.

Reference Books

1.	Charles K. Alexander, Matthew N.O. Sadiku, "Fundamentals of Electric circuits", McGraw-Hill Higher Education, 2007.

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar

List of Experiments (Indicative)

1.	Basics of electronics lab I: Identification of components, symbols, values, resistance color code, schematic circuits.	1 hours
2.	Basics of electronics lab II: Getting started with Multimeter, basic tools, breadboard, proto-board, safety.	1 hours
3.	Measuring voltage using batteries & resistances: measuring voltage of battery, resistance value of resistor, connecting resistances in series/parallel, potentiometers, and voltage divider networks.	2 hours
4.	Resistances and capacitors in DC circuits: capacitance value of capacitor, measuring voltage and current in simple circuits, series-parallel circuits, Time-Voltage measurement of RC circuit.	2 hours
5.	Testing of semiconductor devices: diodes, transistors.	2 hours
6.	Basic circuits with diode: voltage reducer, half-wave rectifier, full-wave rectifier, bridge rectifier.	2 hours
7.	Basic circuits with transistor: common-source, common-gate, common-drain.	2 hours
8.	Experiments with transformers and inductors**:** Transformer testing, electromagnet.	2 hours
9.	Experiments with simple circuits: battery, resistor, capacitor, switches, transistors and LED – simple switching circuit, relay oscillator, transistor switching.	2 hours

10.	Experiments with Op-Amps: Summing, Differentiator, Integrator Circuits.	2 hours
11.	Experiments using 555 timer IC: Flashing LED, touch switch, audio tones, a stable multi-vibrator circuit.	2 hours
12.	Experiments using Logic gate ICs: Truth tables, building AND, OR gates using diodes and resistors.	2 hours
13.	Experiments using function generator ICs: Square, triangle & sine wave generator circuits.	2 hours
14.	Simple sensor circuits: touch, IR proximity, Automatic light switch.	2 hours
15.	Simple actuator and motor circuits.	2 hours
16.	Soldering practice.	2 hours
	Total Laboratory Hours	30 hours

Mode of evaluation:			
Recommended by Board of Studies	14-09-2020		
Approved by Academic Council	No. 59	Date	24-09-2020

Course code	Advanced Form Studies	L	T	P	J	C
BDE3003		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1				

Course Objectives:

- Understanding the fundamentals metaphors in product design.
- Understanding various aspects of form transitions.
- Ability to inspire from nature for form development

Expected Course Outcome:

The students will have,

7. Ability to create forms from nature.
8. Ability to experiment with dynamic forms
9. Ability to use biomimicry as inspirations

Module:1		6 hours
Form and metaphors		
Module:2		8 hours
Nature and Form		
Module:3		8 hours
Form in Transition – movement in time and space		
Module:4		8 hours
Exposure and demonstration of detailing with 3D modelling software.		
Module:5		6 hours
Inspirations from nature		
Module:6		10 hours
Exploration of 3D forms with inspirations from nature and experimentation with dynamic forms		
Module:7		10 hours
Biomimicry as inspirations		
Module:8	Contemporary issues:	4 hours
.		

	Total Lab hours:	60 hours		
Text Book(s)				
1.	Maggie Macnab; Design by Nature: Using Universal Forms and Principles in Design, New Riders, 2011			
Reference Books				
1.	Rudolf Finsterwalder; Form Follows Nature: A History of Nature as Model for Design in Engineering, Architecture and Art, Springer Vienna Architecture, 2011			
2.	Alan Powers; Nature in Design: The Shapes, Colors and Forms that Have Inspired Visual Invention, Conran, 2002			
3.	Ellen Lupton, Jennifer Tobias, Alicia Imperiale, Grace Jeffers, Randi Mates; Skin: Surface, Substance, and Design, Princeton Architectural Press, 2002			
Mode of Evaluation: Assignment / FAT / Project				
Recommended by Board of Studies	24-09-2020			
Approved by Academic Council	No. 59	Date	24-09-2020	

Course code	NEW PRODUCT DEVELOPMENT	L	T	P	J	C
BDE3004		0	0	4	4	3
Pre-requisite	BDE1009					Syllabus version
						v. 1.0

Course Objectives:

Students will,

1. Understand the process to solve consumer problems by innovative products.
2. Identify the needs/ wants/ gap of consumers.
3. Demonstrate the processes of product development, and market strategy.

Expected Course Outcome:

Students will be able to,

1. Apply marketing analysis to make informed decisions at each step of the innovation.

2. Grasp key trade-offs faced by innovative firms

3. Interact with users, collaborators, experts, and firms can be used to identify viable opportunities.

4. Master techniques which are aimed to remove risk from the NPD process.

Module:1		8 hours
Overview and Introduction to New Product Development - Discipline of Innovation		
Module:2		**8 hours**
Consumers and Opportunities - Analyzing Consumer Perceptions, The Customer-Centered Innovation Map		
Module:3		**8 hours**
Ideation and New Product Adoption		
Module:4		**8 hours**
Market Analysis - Pricing, Packaging and Demand Forecasting.		
Module:5		**8 hours**

The New Product Development Process		
Module:6		**8 hours**
Commercialization - A Step-by-Step Guide to Smart Business Experiments, Common Mistakes, Pricing Policies for New Products.		
Module:7		**8 hours**
Strategic Considerations - Why Sustainability is Now the Key Driver of Innovation		
Module:8		**4 hours**
Contemporary discussions with industrial experts and designers.		
	Total Studio hours:	**60 hours**

Text Book(s)

1.	Ashby, Michael, Johnson, Kara, 'Materials and Design: The Art and Science of Material Selection in Product Design', Butterworth-Heinemann, 2002.

Reference Books

1.	Thompson R, 'Manufacturing process for design professionals', Thames and Hudson, London, 2007.
2.	Garratt J, 'Design and Technology', Cambridge University Press, UK, 2004.

Mode of Evaluation: Assignment / FAT / Project

Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No. 57	Date	05-12-2019

Course code	Sustainable Product Design	L	T	P	J	C
BDE3005		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1				

Course Objectives:

- Understanding the role of design in a sustainable world
- Understanding the concept of 'Less is more'

Expected Course Outcome:

The students will have,

10. Ability to generate products with sustainable products.
11. Ability to create Reverse engineering of a given component
12. Understanding the role of design in a sustainable world.

Module:1		6 hours

Understanding 'Form follows nature', 'Form follows Function' and 'Form follows emotion'

Module:2		8 hours

Understanding the concept of 'Less is more'

Module:3		8 hours

The role of aesthetics in society

Module:4		8 hours

The role of design in a sustainable world

Module:5		6 hours

Design in the context of a globalised world

Module:6		10 hours

Exposure to Indian and Asian thoughts on design

Module:7		10 hours

A seminar paper presentation/submission on an issue or concern of relevance to the world and the role of design in solving it.

Module:8	Contemporary issues:	4 hours	
.			
	Total Lab hours:	60 hours	

Text Book(s)	
1.	William Lidwell, Kritina Holden, Jill Butler; Universal Principles of Design, Rockport Publishers, 2003
Reference Books	
1.	Stefano Marzano; Creating Value by Design: Thoughts and Facts Antique Collectors' Club, 1999
2.	Victor Papanek; Design for the Real World: Human Ecology and Social Change, Academy Chicago Publishers, 2005
3.	Friedman, Thomas L.; The World Is Flat: A Brief History of the Twenty-first Century, Publisher: Farrar, Straus and Giroux, 2004
Mode of Evaluation: Assignment / FAT / Project	

Recommended by Board of Studies	24-09-2020		
Approved by Academic Council	No. 59	Date	24-09-2020

Course code	TOY DESIGN	L	T	P	J	C
BDE3006		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1				

Course Objectives:

5. To understand the basic principles and basic rules of toys.
6. Ability to categorizing and classifying the toys.
7. Ability to write stories.
8. Ability to build working toy prototype and sell with secondary packaging.

Expected Course Outcome:

6. Create awareness on play, entertainment and education toy products.
7. Analyze the difference between traditional and modern toys.
8. Understand various idea generating techniques.
9. Understand various multifunctional toys.
10. Understand various material for toys and materials for secondary packaging.

Module:1		4 hours
History of Toys - Introduction of Toy Design.		
Module:2		**6 hours**
Categorising and Classifying- traditional and modern.		
Module:3		**8 hours**
Basic principles and basic rules		
Module:4		**8 hours**
Develop an understanding of the creative process of toy design.		
Module:5		**10 hours**
Design process with a focus on designing for play, entertainment and education.		

Module:6		**12 hours**
Story writing on new ideas, and idea generation, concepts, mock-up modelling		
Module:7		**10 hours**
Actual field testing, user feedback and refinement.		
Module:8		**2 hours**
Contemporary discussions with industrial experts and designers.		
	Total Lecture hours:	**60 hours**

Text Book(s)

1. Toy Design – Chris Van Uffelen – Braun Publishing, Salenstein, 2010
2. Swedish Wooden Toys – Amy Fumiko Ogata - Yale University Press and Bard Graduate Center, New Haven, CT, 2014,

Reference Books

1.	Designed for Kids - New books for children from AMMO Books, Gestalten, Paintbox Press, Princeton Architectural Press, and Schiffer Publishing - 2014

Mode of Evaluation: CAT / Assignment / FAT / Project

Recommended by Board of Studies	24-09-2020		
Approved by Academic Council	No. 59	Date	24-09-2020

Course code	Course title	L	T	P	J	C
BDE3007	MEDICAL PRODUCT DESIGN	0	0	4	4	3
Pre-requisite		Syllabus version				
BDE1009		v. 1.0				

Course Objectives:

To understand the key aspects of designing and developing products for medical applications

Expected Course Outcome:

The students will have,

1. Ability to apply design knowledge in observation and idea generation
2. Understanding to apply design principles pertaining to medical field for designing and developing medical products
3. Knowledge for applying standards pertaining to medical field for designing and developing medical products

Module:1	**Classifying Medical Devices**	**3 hours**

Medical Devices Definitions; Classifying Medical Devices, Classification Rules; Classification

Module:2	**Design Process of Medical Products**	**3 hours**

Case Study; Classification Models; Classification and the Design Process

Module:3	**Regulatory Requirements**	**12 hours**

Design Process versus Design Control, Design Models for medical devices; Cross-Reference with Regulatory Requirements

Module:4	**Design Guidelines**	**12 hours**

Implementing Design Procedures: Review of Guidelines; Overall Procedure; Audit /Review Procedure; The Design Process; Implementing a Procedure for medical devices

Module:5	**Safety Consideration**	**12 hours**

Generating Ideas and Concepts for various medical devices and case studies; Safety aspects

Module:6	**Development of design**	**12 hours**

Developing the Statement of Need; Developing Product Design Specification for the device: The Product Design Specification (PDS); Finding, Extracting, and Analysing the Content

Module:7	**Approval process**	**3 hours**

Quality checks; FDA Approval Process; Indian Approval Process for Medical Devices

Module:8	**Contemporary issues:**	**3 hours**	

Contemporary discussions with the experts from Industry

	Total Lecture hours:	**60 hours**	

Text Book(s)	
1.	1. Peter Ogrodnik, (2012), "Medical Device Design", Academic press
Reference Books	
1.	Biodesign: The Process of Innovating Medical Technologies. Zenios, Makower, and Yock (eds.), CU Press, 2010
2.	Bio-Materials and Prototyping Applications in Medicine. Bartolo and Bidanda (eds.), Springer, 2008

Mode of Evaluation: Assignment / Quiz / FAT / Project / Seminar			
Recommended by Board of Studies	14-9-2020		
Approved by Academic Council	No. 59	Date	24-9-2020

Course code	BIO-INSPIRED PRODUCT DESIGN	L	T	P	J	C
BDE3008		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

1. To implement the foundational knowledge of Biomimicry
2. To understand the principles of sustainability in nature.
3. Ability to impart nature and reliability knowledge in product designs.

Expected Course Outcome:

The students will have,

7. Basic knowledge in Bio-mimicry.
8. Understanding the bio-ecology.
9. Knowledge of sensors inspired from nature.
10. Knowledge of sensors in natural ecosystem.

Module:1		**4 hours**	

Studying Existing Tools and Methods for Bio-Inspired Design

Module:2		**4 hours**	

Cognitive Psychology of Bio-Inspired Design

Module:3		**4 hours**	

Postulating the Future of Bio-Inspired Design Research

Module:4		**4 hours**	

Biomimetic design through natural language analysis

Module:5		**4 hours**	

TRIZ-based Methods for Bio-Inspired Design

Module:6		**4 hours**	

Biomimicry Taxonomy

Module:7		**4 hours**	

Biomimicry design lens and its components.

Module:8	**Contemporary issues:**	**2 hours**	
Contemporary discussion with industry experts.			
	Total Lecture hours:	**30 hours**	

Text Book(s)	
1.	Robert L. Boylestad, Louis Nashelsky, "Electronic Devices and Circuits Theory", 11e, Pearson India.

Reference Books	
1.	Charles K. Alexander, Matthew N.O. Sadiku, "Fundamentals of Electric circuits", McGraw-Hill Higher Education, 2007.

Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar

List of Experiments (Indicative)		**CO: 3,4,5,6**
1.	Basics of electronics lab I: Identification of components, symbols, values, resistance color code, schematic circuits.	1 hours
2.	Basics of electronics lab II: Getting started with Multimeter, basic tools, breadboard, proto-board, safety.	1 hours
3.	Measuring voltage using batteries & resistances: measuring voltage of battery, resistance value of resistor, connecting resistances in series/parallel, potentiometers, and voltage divider networks.	2 hours
4.	Resistances and capacitors in DC circuits: capacitance value of capacitor, measuring voltage and current in simple circuits, series-parallel circuits, Time-Voltage measurement of RC circuit.	2 hours
5.	Testing of semiconductor devices: diodes, transistors.	2 hours
6.	Basic circuits with diode: voltage reducer, half-wave rectifier, full-wave rectifier, bridge rectifier.	2 hours
7.	Basic circuits with transistor: common-source, common-gate, common-drain.	2 hours
8.	Experiments with transformers and inductors**:** Transformer testing, electromagnet.	2 hours
9.	Experiments with simple circuits: battery, resistor, capacitor, switches, transistors and LED – simple switching circuit, relay oscillator, transistor switching.	2 hours
10.	Experiments with Op-Amps: Summing, Differentiator, Integrator Circuits.	2 hours
11.	Experiments using 555 timer IC: Flashing LED, touch switch, audio tones, a stable multi-vibrator circuit.	2 hours
12.	Experiments using Logic gate ICs: Truth tables, building AND, OR gates using diodes and resistors.	2 hours
13.	Experiments using function generator ICs: Square, triangle & sine wave generator circuits.	2 hours
14.	Simple sensor circuits: touch, IR proximity, Automatic light switch.	2 hours
15.	Simple actuator and motor circuits.	2 hours
16.	Soldering practice.	2 hours
	Total Laboratory Hours	30 hours

Mode of evaluation:			
Recommended by Board of Studies	14-09-2020		
Approved by Academic Council	No. 59	Date	24-09-2020

Course code	MOBILITY DESIGN	L	T	P	J	C
BDE 3009		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

4. To understand the essentials of mobility and vehicle design process and be able to make use of different methods for designing related products.
5. To understand the various principles of Vehicle Ergonomics and Packaging.

Expected Course Outcome:

The students will have,

1. Build knowledge on automobiles; from coach building to Mass Production
2. Understanding of vehicle design process from concept to realization
3. Develop ideas using vehicle ergonomics and Packaging
4. Knowledge of styling a vehicle with the principles of Vehicle Aerodynamics and Form.

Module:1		6 hours	
A brief history of automobiles; from Coach building to Mass Production			
Module:2		8 hours	
Vehicle Types, Configurations. Vehicle Construction and Architecture, Trends and Developments			
Module:3		8 hours	
Vehicle Design Process, From concept to Realization			
Module:4		8 hours	
Vehicle Ergonomics			
Module:5		6 hours	
Vehicle Packaging			
Module:6		10 hours	
Styling/ Vehicle Form, Vehicle Aerodynamics and Form, Brand Styles and Values, Styling Trends			
Module:7		10 hours	
Concept sketching and Presentation Skills, CAD Skills, Modelling Skills			
Module:8	Contemporary issues:	4 hours	
Contemporary discussion with the artists and designers.			
	Total Lab hours:	60 hours	

Text Book(s)

Haajanen, L. W. & Nydén, B., Illustrated Dictionary Of Automobile Body Styles, Mcfarland

1.	& Co., Jefferson, N.C., 2002		
2.	Lamm, M. & Holls, D. A Century Of Automotive Style: 100 Years Of American Car Design, Lamm-Morada Pub. Co., Stockton, Calif., 1996		
3.	Lewin Tony, Broff, Ryan, How To Design Cars Like A Pro, Mbi Publishing Company, MN, USA, 2003		
4.	Norbye, J. P., Car Design: Structure & Architecture, Tab Books, Blue Ridge Summit, PA, 1984		
Reference Books			
1.	Sparke, P., A Century Of Car Design, Mitchell Beasley, London, 2002		
Mode of Evaluation: Assignment / FAT / Project			
Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	57	Date	05-12-2019

Course code	ADVANCED SMART PRODUCT DESIGN	L	T	P	J	C
BDE4001		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

4. Students will be introduced to materials used in a circuit board.
5. Knowledge on component selection
6. Enhancing the ability to design and develop smart electronic circuits

Expected Course Outcome:

The students will be able to,

6. Design PCB Layouts using CAD Software
7. Assemble, test and re-work on PCBs
8. Understand the role of packaging in electronics
9. Build prototypes using protoboards.

Module:1	6 hours

Introduction to materials used in electronics circuit board and their properties : FR4, Copper, Solder, Solder mask, Silkscreen, Solder etc.
Introduction to circuit Schematics and PCB Layout using CAD software.
Calculate trace width, shape and size requirements, number of layers, routing etc.

Module:2	8 hours

Introduction to component selection, datasheet, and sourcing.
Make a PCB using chemical etching technique : Etch resistant pens, Direct Toner Transfer, Photo-resistive laminates, etching using ferric chloride, drilling of through holes, stencil cutting etc.

Module:3	8 hours

PCB assembly, testing and rework : Soldering & de-soldering practice, mounting SMT & Through Hole components, continuity testing, functional testing.
3D modelling of electronic component & PCB assemblies.

Module:4	8 hours

Concept development of an smart electronics product : identifying need, selecting components, sourcing, Creation of schematic diagram, Generate Bill of Materials.
Introduction to electronics packaging - Enclosure design, thermal management. Introduction to advanced PCB manufacturing process.

Module:5	6 hours

Introduction to single board computers : Raspberry Pi, Zero.
Introduction to Python programming language.
Make a smart product using Raspberry Pi and Arduino.

Module:6	10 hours

Make an prototype of a smart electronics product using protoboards : Part 1 – design, review, testing, programming.

Module:7		10 hours
Make an working prototype of a smart electronics product : Part 2 - using custom made Printed Circuit Board assemblies. Documentation : Circuit diagrams, parts lists, master printed circuit artwork, parts sources, software source code and documentation, mechanical drawings, assembly drawings, and all other items included as part of a project's deliverables.		
Module:8	Contemporary issues:	4 hours
Contemporary discussion with industrial experts and designers.		
	Total Lab hours:	60 hours

Text Book(s)	
1.	Fundamentals of Internet of Things for Non-Engineers (Technology for Non-Engineers) , by Rebecca Lee Hammons, Ronald J. Kovac, CRC Press,
Reference Books	
1.	Make: Electronics, Second Edition, by Charles Platt, Shroff Publishers

Mode of Evaluation: Assignment / FAT / Project			
Recommended by Board of Studies	24-09-2020		
Approved by Academic Council	No. 59	Date	24-09-2020

Course code	Advanced Computer Modelling and Simulation Techniques	L	T	P	J	C
BDE 4002		0	0	4	4	3
Pre-requisite		Syllabus version				
		v. 1.0				

Course Objectives:

The students will be able to,

4. Create digital expression of industrial design.
5. Demonstrate higher proficiency using digital mediums for 2D and 3D modelling.
6. Apply advanced techniques to create realistic simulations of products.

Expected Course Outcome:

The students will have ability to,

1. Produce digital representation of organic forms.

2. Create 3D digital modelling using varied tools and techniques.

3. Apply knowledge of advanced digital tools for product modelling.

Module:1		2 hours
Introduction to 3D parametric and non-parametric software.		
Module:2		**6 hours**
3D modelling – Surface modelling and techniques.		
Module:3		**6 hours**
Understanding the basic principles and methods of non-parametric 3D modelling.		
Module:4		**6 hours**
Explore organic product forms.		
Module:5		**16 hours**
Creating organic forms for products through modelling with layers.		

Module:6		**12 hours**
3D rendering and simulation - Introduction to 3D rendering and simulation.		
Module:7		**10 hours**
3D rendering and simulation – Application of product simulation and rendering.		
Module:8		**2 hours**
Contemporary discussions with industrial experts and designers.		
	Total Studio hours:	**60 hours**

Text Book(s)	
1.	Autodesk Fusion 360 For Beginners: Part Modelling, Assemblies, and Drawings - 2019
Reference Books	
1.	Modelling and Simulation using MATLAB - Simulink, 2ed Paperback – 2015 by Shailendra Jain
2.	Modeling and Simulation Paperback – 2012 by Pushpa Singh, Narendra Singh
3.	SOLIDWORKS 2019 Learn by doing: Sketching, Part Modeling, Assembly, Drawings, Sheet metal, Surface Design, Mold Tools, Weldments, MBD Dimensions, and Rendering – 2019.

Mode of Evaluation: Assignment / FAT / Project			
Recommended by Board of Studies	27-11-2019		
Approved by Academic Council	No.57	Date	05-12-2019

Course code	PRODUCT PLANNING AND STRATEGY	L	T	P	J	C
BDE1xxx		2	2	0	0	3
Pre-requisite		Syllabus version 1.0				

Course Objectives:

The course prepares students to,

1. Create, lead and manage new products, systems and services.
2. Understand the sustainable impact of the new product on the economy, society and the environment.

Expected Course Outcome:

Students will have ability to,

1. Integrate design-led strategies into existing practice in business, government agencies, social enterprise and communities.
2. Implement sustainable design practices in the existing / new system.

Module:1	Product Planning	4 hours

Introduction: Generic development process and its adaptation – Product development process flows

Identifying the opportunities – Evaluate and prioritize projects – Allocate resourses and plan timing – Complete pre-project planning – Reflect on the result and the process

Module:2	Strategy for New Product Development	4 hours

Gathering strategic information: Determining existing opportunities – Developing product options – Setting criteria for product inclusion.

Module:3	Brand strategy	4 hours

Product differentiation and positioning - Creating product portfolio – Managing portfolio

Module:4	Design for X	8 hours

Design for Sustainability – Design for Quality - Design for Usability - Design for Cost - Design for Reliability

Module:5	**Concept Testing**	**4 hours**
Quality Function Deployment (QFD): Customer requirement – Development of product concepts – Evaluation – Derivation of product requirement – Development process – quality control, Decision Tree Analysis - KANO Model – Weighting and Rating		
Module:6	**Business Analysis**	**4 hours**
Cost benefit analysis - Stake holder analysis		
Module:7	**Contemporary issues:**	**2 hours**
Contemporary discussion with the artists and designers.		
	Total Lecture hours:	**30 hours**

Text Book(s)

1.	T., Ulrich. K., Eppinger, S. D., & C., Y. M. (2020). *Product design and development*. New York, NY: McGraw-Hill Education.

Reference Books

1.	Trott, P. (2021). *Innovation management and new product development*. Hoboken: Pearson.
2.	Mital, A. (2017). *PRODUCT DEVELOPMENT*. ELSEVIER.
3.	Aspelund, K. (2015). *The design process*. London: Fairchild Books, an imprint of Bloomsbury Publishing.
4.	Kahn, K. B. (2015). *Product planning essentials*. New York: Routledge.

Mode of Evaluation: Assignment / Quiz /CAT / FAT

Recommended by Board of Studies	18-02-2021		
Approved by Academic Council	No.61	Date	24 Sep 2020

Course code	DESIGN MANAGEMENT	L	T	P	J	C
MGT1055		2	2	0	0	3
Pre-requisite		Syllabus version				
		1.0				

Course Objectives:

The course provides,

1. Develop management skills enabling them to engage in innovative projects based on design as a strategic asset.
2. Ability to better utilize the tools learnt in the course and to face the challenges confidently.
3. Exposure to real world instances where design process has provided successful solutions to various challenges.
4. Exposure to the various factors to be considered when starting up a design studio on their own.

Expected Course Outcome:

The students will be able to,

1. Demonstrate a high degree of professionalism characterized by initiative and creativity.

2. Express ideas effectively and communicate information appropriately and accurately using a range of media including ICT.

3. Develop working relationships using teamwork and leadership skills

4. Critically reflect on experience of significant managerial responsibility on setting up a design firm.

Module:1		4 hours

Creativity and Innovation- a deeper study. -Enables the student to grasp the difference and to understand the importance and relevance in Design.

Module:2		4 hours

Why "Design"- perspectives from Management view.- How does Design help an industry?

Module:3		4 hours

Understanding Brand and its value.- Helps the student to perceive the core brand identity and value and orient design accordingly.

Module:4		**4 hours**
Employment vs Design Start up- Lays out the pros and cons of both, so that the student can take a balanced decision.		
Module:5		**4 hours**
Necessary skills for a start-up.- Exposes the students to several soft skills and the discipline required to start and sustain a Design venture.		
Module:6		**4 hours**
Attributes of a Designer- imparts to the students good practices relating to a design professional. People management.- How to identify and deal with the right People support. Outsourcing work…		
Module:7		**4 hours**
Financial management- Project outlays, Cash Flow etc. Marketing "design".- How to market yourself and your studio. Social Media management.- Relevance of Social Media and how to maintain and use it for promotional purposes.		
Module:8	**Contemporary issues:**	**2 hours**
Contemporary discussion with the artists and designers.		
	Total Lecture hours:	**30 hours**

Text Book(s)	
1.	CHANGE BY DESIGN, Tim Brown (2009), Harper Collins Publishers, NY
Reference Books	
1.	LOONSHOTS : How to Nurture the Crazy Ideas That Win Wars, Cure Diseases, and Transform Industries, Safi Bahcall (2019), St. Martin's Press, NY

2.	Art of Innovation, Tom Kelly (2016), Profile Books Ltd, London		
3.	Known: The Handbook for Building and Unleashing Your Personal Brand in the Digital Age, Mark Schaefer (2017), Schaefer Marketing Solutions, USA		
Mode of Evaluation: CAT / Assignment / Quiz / FAT / Project / Seminar			
Recommended by Board of Studies	18-02-2021		
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