

ORDINANCE

FOR

**BACHELOR OF DESIGN IN AUTOMOTIVE
& PRODUCT DESIGN**



(THIS ORDINANCE HAS BEEN APPROVED IN THE MEETING OF
BOARD OF STUDIES HELD ON DATED 27 May, 2022)

APPLICABLE W.E.F. ACADEMIC SESSION 2022-2023



SRI HARGOBINDGARH, PHAGWARA – HOSHIARPUR ROAD,
PHAGWARA 144401, PUNJAB

SRI HARGOBINDGARH, PHAGWARA – HOSHIARPUR
ROAD, PHAGWARA 144401, PUNJAB

ORDINANCE FOR BACHELOR OF DESIGN IN AUTOMOTIVE AND PRODUCT DESIGN

SHORT TITLE AND COMMENCEMENT

- I. This Ordinance shall be called the Ordinance for the Bachelor of Design in Automotive and Product Design Program of GNA University, Phagwara.
- II. This ordinance shall come into force with effect from academic session 2022-23.

1. Name of Program: Bachelor of Design in Automotive and Product Design

2. Name of Faculty: Faculty of Engineering, Design and Automation.

3. Program Outcomes:

After the completion of the Bachelor of Design Automotive and Product Design, the student will be able to

- I) Apply the knowledge of colour theory, material science, user ergonomics and design process to the solution of complex design problems.
- II) Identify, research literature, ideate on and analyse design problems to arrive at substantiated conclusion.
- III) Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
- IV) Understand the needs and requirements of the customers and clients and design accordingly.
- V) Create a design that considers functionality, aesthetics and ergonomics of the product.
- VI) Develop a design from concept phase to a prototype.

4. Program Specific Outcomes:

After the completion of B.Tech. Robotics and Automation Engineering, the student will be able to :

- I. Present the design and communicate well in front of concerned members of the organization.
- II. Create an ethical and sustainable design.
- III. Add value to every business decision with a holistic approach.

IV. To acquaint the students with the design history and process of conceptual design.

V. To prepare the students for latest trends and technologies and guide them about the future of concept design industry.

VI. To impart upon students how the design affects sales and brand of a company.

VII. To enable the students to work in teams in design companies and design studios

5. Program Duration: Total duration of the Program shall be of 4 years and each year will comprise of two semesters. In addition, each semester shall normally have 90 working days.

6. Eligibility for Admission: 10+2 or equivalent (with Physics, Chemistry and Mathematics as compulsory subjects) with 50% (45 % for SC/ST/OBC) marks in aggregate from any recognized board.

or

Three-year full-time diploma in Engineering (any stream) after class 10th from any = recognized board/university.

7. Admission Process: The centralized admission cell shall make selection for admission to the program. The selection of the candidate shall be strictly on merit basis, subject to fulfillment of

eligibility criteria. Candidates are required to fill the prescribed application form and submit the same to the admission cell. The admission cell after verifying the eligibility will forward the form to the Office of Registrar for further processing. If the candidate is selected, he/she is required to deposit the prescribed fee along with the application form and the required documents to the Office of Registrar.

8. Curriculum: The 4 years curriculum has been divided into 8 semesters and shall include lectures/tutorials/laboratory work/field work/outreach activity/project work/vocational training/viva/seminars/presentations/term papers/assignments etc. or a combination of some of these. The curriculum will also include other curricular, co-curricular and extra curricular activities as may be prescribed by the University from time to time.

9. Choice Based Credit System:

The University has adopted Choice Based Credit System (CBCS), which provides an opportunity

to the students to choose courses from the offered courses comprising of Core, Elective, Ability Enhancement and Audit Courses. The choice based credit system provides a “flexible” approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. Following are the types of courses and structure for the program:

Course Categories:

I. Core Course: A course, which should compulsorily be studied by a candidate as a core requirement to complete the requirement of program in a said discipline of study.

II. Elective Course: Generally, a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

III. Discipline Specific Elective (DSE) Course: Elective courses may be offered by the main discipline/subject of study, is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses from unrelated discipline (to be offered by main discipline/subject of study).

IV. Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/subject, with an intention to add generic proficiency to the students.

Note: A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective. Elective Course(s) may also be called an “Open Elective”

V. Foundation Course: The Foundation Courses may be of two kinds: Compulsory Foundation and Elective foundation. “Compulsory Foundation” courses are the courses based upon the content that leads to Knowledge enhancement. They are mandatory for all disciplines.

VI. Ability Enhancement Courses (AEC): The Ability Enhancement (AE) Courses may be of two kinds: Ability Enhancement Compulsory Courses (AECC) and Skill Enhancement Courses (SEC). “AECC” courses are the courses based upon the content that leads to Knowledge

enhancement; i. Environmental Science and ii. English/MIL Communication. These are mandatory for all disciplines. SEC courses are value-based and/or skill-based and are aimed at providing hands-on-training, competencies, skills, etc.

VII. Ability Enhancement Compulsory Courses (AECC): Environmental Science, English Communication/MIL Communication.

VIII. Skill Enhancement Courses (SEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge.

10. Medium of Instructions:

- The medium of instructions will be English.
- Jury presentations will be done in English.
- Practical work/Project Work / Project Report / Dissertation / Field Work Report / Training Report etc., if any, should be presented in English.

11. Mode: The program is offered in 'Full Time' mode of study only.

12. Attendance Requirement to be Eligible to Appear in End Semester Examination:

12.1 Every student is required to attend at least 75% of the lectures delivered squaring tutorials, practical and other prescribed curricular and co-curricular activities.

12.2 Dean of Faculty may give a further relaxation of attendance up to 5% to a student provided that he/she has been absent with prior permission of the Dean of the Faculty for the reasons acceptable to him/her.

12.3 Further, relaxation upto 10% may be given by The Vice Chancellor to make a student eligible under special circumstances only.

12.4 No student will be allowed to appear in the end semester examination if he/she does not satisfy the attendance requirements. Further, the attendance shall be counted from the date of admission in the University or commencement of academic session whichever is later.

13. Credit: Each course, except a few special audit courses, has a certain number of credits assigned to it depending upon its lecture, tutorial and/or laboratory contact hours in a week. A letter grade, corresponding to specified number of grade points, is awarded in each course for which a student is registered. On obtaining a pass grade, the student accumulates the course

credits as earned credits. A student's performance is measured by the number of credits that he/she has earned and by the weighted grade point average. A minimum number of credits should be acquired to qualify for the programs. The absolute grading system has been followed for awarding grades in a course.

Earned Credits (EC): The credits assigned to a course in which a student has obtained 'D' (minimum passing grade) or a higher grade will be counted as credits earned by him/her. Any course in which a student has obtained F, or W or "I" grade will not be counted towards his/her earned credits. A unit by which the course is measured. It determines the number of hours of instruction required per week.

Contact Hours per Week	Credit Assigned
1 Hr. Lecture (L) per week	1 credit
1 Hr. Tutorial (T) per week	1 credit
2 Hours Practical (Lab) per week	1 credit

14. Program Structure:

Semester I (First Year)										
S. No.	Category	Course Code	Course Title	Hours per week			Marks Distribution			Credits
				Lecture	Tutorial	Practical	Internal	External	Total	
1.	N.A	APD101	History of Design	2	0	0	40	60	100	2
2.	N.A	APD102	Basics of Sketching	1	1	2	40	60	100	3
3.	N.A	APD103	Automotive Basics and Mechanics	2	1	0	40	60	100	3
4.	N.A	APD104	Colour Theory	1	0	4	40	60	100	3
5.	N.A	APD105	Elements of Design	2	1	4	40	60	100	5
6.	N.A	COM101	English Communication	2	0	0	40	60	100	2
7.	N.A	COM121	English Communication Lab	0	0	2	30	20	50	1
				25			270	380	650	19

Semester II

S. No.	Category	Course Code	Course Title	Hours per week			Marks Distribution			Credits
				Lecture	Tutorial	Practical	Internal	External	Total	
1.	N.A	APD106	Engineering Drawing	1	0	4	40	60	100	3
2.	N.A	APD139	Product photography	2	0	0	40	60	100	2
3.	N.A	APD108	Introduction to Digital Sketching	1	0	2	40	60	100	2
4.	N.A	APD109	Product Design Process	3	0	0	40	60	100	3
5.	APD102	APD111	Organic Sketching In Product Design	1	0	6	40	60	100	4
6.	N.A.	ENS001	Environmental Studies	2	0	0	40	40	100	2
7.	COM101	COM201	Business Communication	2	0	0	40	60	100	2
8.	COM121	COM221	Business Communication Lab	0	0	2	30	20	50	1
			Total	26			310	440	750	19

Semester III

S. No.	Category	Course Code	Course Title	Hours per week			Marks Distribution			Credits
				Lecture	Tutorial	Practical	Internal	External	Total	
1.	APD103	APD201	Automotive & Product Materials	2	1	0	40	60	100	3
2.	ESC	BCS209	Basics of Python	3	0	0	40	60	100	3
3.	PCC	BMA302	Computer Aided Design-I	3	0	0	40	60	100	4
4.	PCC	BMA303	Strength of Material	3	1	0	40	60	100	3
5.	ESC	BEE301	Electronic Devices	3	0	0	40	60	100	4
6.	ESC	BEE301	Electronic Devices	3	0	0	40	60	100	4
			Total	29			260	340	600	20

Semester IV

S. No.	Category	Course Code	Course Title	Hours per week			Marks Distribution			Credits
				Lecture	Tutorial	Practical	Internal	External	Total	
1.	N.A.	APD205	Design Research	1	1	0	40	60	100	2
2.	APD203	APD206	Product Design Modeling II	1	0	4	40	60	100	3
3.	N.A.	APD207	Clay Modeling- I	0	0	4	60	40	100	2
4.	N.A.	APD112	Ergonomics & Packaging	2	1	2	40	60	100	4
5.	APD109		DSE- 1				40	60	100	4
6.	APD201	APD306	Design Project II	2	1	4	40	60	100	5
			Total	29			260	340	600	20

Semester V

S. No.	Category	Course Code	Course Title	Hours per week			Marks Distribution			Credits
				Lecture	Tutorial	Practical	Internal	External	Total	
1.	N.A	APD301	Digital Surfacing I	1	0	4	40	60	100	3
2.		APD116	Graphic Design & Portfolio Design	2	2	0	40	60	100	4
3.	APD207	APD302	Clay Modeling II	2	0	2	40	60	100	3
4.			DSE II				40	60	100	4
5.			GE II	1	1	4	40	60	100	4
6.	N.A.	APD114	CMF - Colour Material & Finish	2	1	2	40	60	100	4
			Total	30			240	360	600	22

Semester VI

S. No.	Category	Course Code	Course Title	Hours per week			Marks Distribution			Credits
				Lecture	Tutorial	Practical	Internal	External	Total	
1.	APD301	APD303	Digital Surfacing II	1	0	4	40	60	100	3
2.	APD206 APD303	APD304	3D Model Rendering	1	0	4	40	60	100	3
3.		APD001	Industrial Visit	-	-	-	30	20	50	2
4.			DSE III				40	60	100	4
5.			GE II	1	1	4	40	60	100	4
6.	APD109 APD201	APD307	Design Project III	2	1	4	40	60	100	5
			Total	29			230	320	550	21

Semester VII

S. No.	Category	Course Code	Course Title	Hours per week			Marks Distribution			Credits
				Lecture	Tutorial	Practical	Internal	External	Total	
1.	APD115	APD113	Aerodynamics & Safety Regulations	2	2	0	40	60	100	4
2.			DSE IV				40	60	100	4
3.			GE III	1	1	4	40	60	100	4
4.	APD109 APD201	APD309	Design Project IV	2	1	4	40	60	100	5
5.		APD117	Design Seminar (Website Design UI/UX)	0	0	6	60	40	100	3
			Total	23			220	280	500	20

Semester VIII

S. No.	Category	Course Code	Course Title	Hours per week			Marks Distribution			Credits
				Lecture	Tutorial	Practical	Internal	External	Total	
1.		APD400	Graduation Project							25
2.										25

A) Core Courses

S.No.	Pre-Requisites	Course Code	Course Name
C1		APD101	History of Design
C2		APD102	Basics of Sketching
C3		APD103	Automotive Basics and Mechanics
C4		APD104	Colour Theory
C5		APD105	Elements of Design
C6		APD106	Engineering Drawing
C7		APD108	Introduction to Digital Sketching
C8		APD109	Product Design Process
C9	APD103	APD201	Automotive Product Materials
C10		APD202	Manufacturing Processes
		BAM304	Architecture Pre Viz – Modeling and Texturing
C11		APD203	Product Design Modeling I
C12	APD108	APD204	Digital Sketching & Rendering
C13		APD205	Design Research
C14	APD203	APD206	Product Design Modeling II
C15		APD207	Clay Modeling I
C16		APD301	Digital Surfacing I
C17	APD207	APD302	Clay Modeling II
C18	APD301	APD303	Digital Surfacing II
C19	APD206 APD303	APD304	3D Model Rendering
C20	APD109 APD201	APD305	Design Project I
C21	APD109 APD201	APD306	Design Project II (Technically Advanced Group project)
C22	APD109 APD201	APD307	Design Project III
C23	APD109 APD201	APD309	Design Project IV
C24		APD116	Graphic Design & Portfolio Design
C25		APD117	Design Seminar (Website Design, UI/UX)
C26		APD001	Industrial Visit
C27		APD120	Website Design (UI/UX)
C28		APD400	Graduation Project

B) Ability Enhanced Compulsory Courses (AECC)

S. No.	Pre-Requisites	Course Code	Course Name
AECC1	N. A	COM101	English Communication
		COM121	English Communication Lab
AECC2	COM101	COM201	Business Communication
	COM121	COM221	Business Communication Lab
AECC3	N. A	ENS001	Environmental Studies

C) Skill Enhanced Course (SEC) (Credit: 04 each)

S. No.	Pre-Requisites	Course Code	Course Name
SEC1	APD102	APD111	Organic Sketching in Product Design
SEC2		APD112	Ergonomics and Packaging
SEC3		APD113	Aerodynamics and Safety Regulations
SEC4		APD114	CMF Colour Material & Finish

D) Discipline Specific Elective (DSE) (Credit: 04 each)

Pre-Requisites	Course Code	Course Name	Contact Hours			Credits
			L	T	P	
N.A	APD121	Car design sketching I	1	1	4	4
N.A	APD122	Bike design sketching I	1	1	4	4
N.A	APD125	Interior Sketching I	1	1	4	4
N.A	APD124	Product design detailing I	1	1	4	4
APD121	APD221	Car design sketching II	1	1	4	4
APD122	APD225	Bike design sketching II	1	1	4	4
APD123	APD226	Interior Sketching II	1	1	4	4
APD124	APD224	Product design detailing II	1	1	4	4
BAM304	BAM403	Architecture Pre Viz – Lighting & Rendering	2	1	2	4
BAM304	APD328	Domestic Interiors	1	1	4	4
APD106	APD329	Furniture Design	1	1	4	4
BAM403	APD427	Commercial Space	1	1	4	4

E) Generic Electives: As Applicable

Pre-Requisites	Course Code	Course Name	Contact Hours			Credits
			L	T	P	
N.A	APD126	Toy Design	1	1	4	4
N.A	APD127	Social Project	1	1	4	4
N.A	APD128	Narrative Skills & Story Boarding	1	1	4	4
N.A	APD129	Design of Everyday Object	1	1	4	4
N.A	APD130	Sci Fi Project Yr 2050	1	1	4	4
N.A	APD131	Smart Product Design	1	1	4	4
N.A	APD132	Yacht Design	1	1	4	4
N.A	APD134	Mass Transport Design	1	1	4	4
N.A	APD135	3 Wheeler Design	2	1	2	4

	Theory+ Tutorial + Practical	Total
I. Core Course	11X 1 Theory = 11	
(32 Papers)	9X 2 Theory = 18 2 X 3 Theory = 06	35
Core Course Practical	4X1 Practical = 04 5X3 Practical = 15 1X4 Practical = 4 12 X 2 Practical = 24	47
Core Course Tutorial	6X1 Tutorial = 06 1X21 Tutorial = 21	27
II. Elective Course (4 Papers)		
1. Discipline Elective Course	4 X 2 Tutorial = 08	08
Discipline Elective (Practical)	4 X 2 Tutorial = 08	08
2. General Elective (3 Papers)	3 X 1 Lecture = 3	12
	3 X 1 Tutorial = 3 3 X 2 Tutorial = 6	
III. Ability Enhancement Courses		
1. Ability Enhancement Compulsory	08	08
2. Skill Enhancement Course (4 Courses)		
THEORY	8	
PRACTICAL	5	
TUTORIAL	3	16
IV. Museum & Industrial Visit	02	02

COURSE SCHEME					
Semester	Core Course (CC) 4	Ability Enhancement Compulsory Course (AECC) (4)	Skill Enhancement Elective Course (SEC) (4) Skill Based	Discipline Specific Elective (DSE) (4)	Generic Elective (GE) (4)
I	CC - 1	AECC - 1			
	CC - 2				
	CC - 3				
	CC - 4				
	CC - 5				
II	CC - 6	AECC 2 & AECC 3	SEC -1		
	CC - 7				
	CC - 8				
	CC - 9				
	CC - 10				
III	CC - 11		SEC -2	DSE-1	
	CC - 12				
	CC - 13				
	CC - 14				
SHOWROOM/MUSEUM VISIT					
IV	CC - 15			DSE-2	
	CC - 16				
	CC - 17				
	CC - 18				
V	CC - 19			DSE-3	GE 1
	CC - 20				
	CC - 21				
	CC - 22				
INDUSTRIAL VISIT					

15. Examination/Continuous Assessment System (CAS):

For CAS two assessment components are adopted to evaluate student's performance.

15.1 Internal Assessment, which includes attendance, mid semester examination and other components (Assignment, Snap Test, Project, Presentation/ Class Participation, Practical Lab Continuous Assessment, Quiz, Multiple Choice Questions, Case Study, Field Survey/Field Report etc.) carrying a weightage of 40%.

Sr. No.	Components of Continuous Internal Evaluation
1	Assignment
2	Snap Test
3	Project
4	Presentation/ Class Participation
5	Practical Lab Continuous Assessment
6	Quiz, Multiple Choice Questions
7	Case Study
8	Field Survey/Field Report

15.2 External Assessment i.e. End Semester Examination, carrying a weightage of 60%.

15.3 Internal Assessment of practical's i.e. Practical Lab Continuous Assessment, carrying a weightage of 60%.

15.4 External Assessment of practical's i.e., Practical Lab External, carrying a weightage of 40%

15.5 Every student has to score at least 25% marks each in Continuous Assessment and End Semester examination. The minimum pass percentage is 40% in aggregate. In case a student scores more than 25% each in Continuous Assessment and End Semester Examination, but overall percentage in the concerned subject remains less than 40%, then student has to repeat End Semester Examination in that subject.

16. Grading System: University follows eight letter grading system (A+, A, B+, B, C+, C, D, and F) that have grade points with values distributed on a 10 point scale for evaluating the performance of student. The letter grades and the corresponding grade points on the 10-point scale are as given in the table below.

Academic Performance	Range of Marks	Grades	Grades Points	Remarks
Outstanding	≥90	A+	10	
Excellent	≥80 & <90	A	9	
Very Good	≥70 & <80	B+	8	
Good	≥60 & <70	B	7	
Fair	≥50 & <60	C+	6	
Average	≥40 & <50	C	5	
Minimally Acceptable	40	D	4	
Fail	<40	F	0	
Incomplete		I	-	
Withdrawal		W		
Grade Awaited		GA	-	
Minor Project		S/US		S-Satisfactory US-Unsatisfactory

NB: The CGPA can be converted to percentage by using the given formula:

$$\text{CGPA} \times 10 = \%$$

e.g. $7.8 \times 10 = 78\%$

Note: Cumulative Grade Point Average (CGPA), it is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (Course title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

15.6 Acceptance of MOOC courses

Faculty of Engineering, Design and Automation accepts the MOOC course available on SWAYAM platform for credit transfer. 40% of the courses can be taken from the available list of MOOCs on SWAYAM.

Instructions for MOOC courses

a) MOOC courses taken for credit transfer must be approved and recommended by Dean

Academics and Dean of the Faculty before the start of the semester.

b) The copy of the list of courses taken by the students for any course has to be submitted to the Controller of the Examination.

c) MOOC course should be done from SWAYAM platform as per the guidelines of UGC.

d) To obtain the credit the student needs to complete the assessment of the course and provide the certificate of the course issued by the SWAYAM/NPTEL. After completing the certificate, the student must submit the certificate within a week to the department.

e) The fees (if any) for the registration and / or assessment of the MOOC course must be borne by the student only.

f) The student can opt for a particular online MOOC course if and only if the credit of that course is equivalently mapped with the program structure.

g) If the student obtains the same course credit which mapped with the course, then credit shall be considered for this course and the grade/marks provided by the accessing authority shall be transfer to the student. The result of the MOOC shall be taken on record by the university examination cell and a result declared for these papers.

h) For any particular semester, all results for the MOOC course must be submitted along with the marks of other papers of the same semester by the course coordinator.

MOOC course coordinators shall be appointed for each of the course taken by the student.

Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (Course title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

17. Re-appear: Student with backlog of one semester will be carried forward to next semester. Re-appear examinations will be conducted twice in a year after ESE of every semester.

18. Improvement of overall Score: A candidate having CGPA < 5.5 and wishes to improve his/her overall score may do so within two academic years immediately after passing nth degree program by reappearing into maximum four course(s)/subject(s). The improvement would be considered if and only if the CGPA becomes > 5.5.

19. Program qualifying criteria: For qualifying the Program every student is required to earn prescribed credits 169. If any student fails to earn prescribed credits 169 for the program, then he/she will get a chance to complete his/her Program in two more years than the actual duration of degree.

20. Revision of Regulations, Curriculum and Syllabi: The University may revise, amend, change or update the Regulations, Curriculum, Syllabus and Scheme of examinations through the Board of Studies and the Academic Council as and when required.



BACHELOR OF DESIGN IN AUTOMOTIVE & PRODUCT DESIGN

FACULTY OF ENGINEERING, DESIGN & AUTOMATION

(Applicable for 2022-2023 onwards)

SEMESTER I

APD101: HISTORY OF DESIGN

LTP 200

Pre-Requisites: N.A

Course Objectives:

1. Introduction to Design
2. Importance of Design in Life
3. Design Evolution and Research

Contents:

The beginnings of design culture

Studying the interrelationships between design artifacts, the work of designers, design production (including marketing, advertising and distribution), and consumption.

Unit I

- History of design in Middle Ages
- Bauhaus school of design.
- Ulm School of Design.
- The example of Braun

Unit II

- Art Deco Movement

- Art Nouveau Movement
- Arts & crafts Movement
- Pop Art Movement
- Other different types of art movements

Unit III

- Memphis Group
- The Victorian Movement
- Modern and Post Modernism.
- Dekonstruktivism Movement.
- The industrial revolution and the rise of modern design

Assignments:

- Choose a Mood board, for an ART Movement and draw a product according to the design language of that era.
- Draw the hierarchy diagram of design movements and give examples of prominent designs at that point.
- Take any Indian design and explain its design details.

Recommended Books:

1. Design History: Understanding Theory and Method by KjetilFallan.
2. Indian Textiles by John Gillow and Nicholas Barnard
3. India by Design: Colonial History and Cultural Display by SaloniMathur
4. History of Modern Design by David Raizman
5. Scandinavian Design: Alternative Histories by KjetilFallan
6. Art Deco and British Car Design: The Airline Cars of the 1930s by Barrie Down.
7. A Century of Automotive Style: 100 Years of American Car Design by Michael Lamm and Dave Holls.
8. The People's Car: A Global History of the Volkswagen Beetle by Bernhard Rieger.
9. A Century of Car Design by Penny Sparke.
10. The Art Nouveau Style Book of Alphonse Mucha (Dover Fine Art, History of Art) by Alphonse Mucha.

APD102: BASICS OF SKETCHING

LTP 112

Pre-Requisites: N.A.

Course Objectives:

This course introduces the world of sketching and design to students. It gives an overview of various sketching materials, sketching mediums, and basic terminology of various design tools used in the industry.

Contents:

Unit I

Introduction: Why do we sketch? Difference between Free hand sketching and Technical sketching, Importance of dimensions and scale. Different mediums of sketching. Tools in sketching. Paper sizes. Presentation boards and techniques.

Drawing of straight lines and curves. Importance of line weight. Introduction to light and shadows.

Drawing of ellipses and circles. Shading techniques of 2D objects with respect to different geometry shapes and reflections in various materials.

Unit II

Methods of pencil drawing through exercises, to coordinate eye, hand and body movements to acquire necessary control over the line drawing. Uni-directional sketching. Focal point in sketching.

In this module we are going to discuss about forms and their size, scale, structure and relationship between them and their proportion by showing various illustrated examples for easy understanding of the subject matter, followed by specific context oriented hands on assignments in the class itself or students may be used to check this theory by taking photographs of any objects digitally and manipulate the same in computer to compare their size and scale with their surrounding objects, but the author encourages students to work manually).

Unit III

Introduction to Perception: Line of horizon (above, below and on the line of horizon), vanishing point, Linear or one Point Perspective, Two-Point Perspective, Three-point Perspective. Three perspective angles for your clear visual understanding eye level. Perspective sketching and merging perspective (1 point and 2 point perspective merging, 2 point and 3 point perspective merging)

Unit IV

Developing basic drawing Lines-straight, curvilinear, angular, thick-thin, plane, volume etc. Creating depth with shading, Foreshortening, Casting Shadows, Conveying Movement, Rendering Wave Action, Silhouetting, Drawing with a grid, Seeing the shapes and forms. Sketching the Shapes, Adding Shadows, Drawing Cast Shadows, Understanding Lights and Shadows, Highlighting, Shading, Shading Consistently. Representation of basic 3-dimensional forms, Cubes, cylinders, cones, spheres etc. in different combinations and sizes to understand principles of perspectives, Hatching, cross hatching, stippling, scribbling, blending, Basic marker renders

Assignments:

1. Single point perspective Alphabet exercise, A to Z
2. Two point Perspective Number Exercise.
3. Cubes in 3 point perspective
4. Chairs and simple products in 3 point perspective.
5. Shading of cubes

Assignments:

1. Straight line exercises
2. Different types of lines exercises
3. Ellipse and circles exercise
4. Boxes
5. Use of ellipse to draw bottles

Recommended Books:

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

Pre-Requisites: N.A.

Course Objective:

The Students are taught basics of Automobile Architecture/Platform and internals of the machine

Course Content

Unit I

Vehicle Power Systems Automobiles are the vehicles which have the capacity of covering distances without any human or animal force. The engines or motors enable the movement of these vehicles in many forms. The current topic discusses few of those power systems.

Prime Movers & Energy Sources Petrol/diesel engines, electric motors, turbines, fuel cells, etc. (overview of applications), basic functions and arrangement of components.

Components of vehicle Basic structure, power unit, transmission system, accessories, superstructure.

Layout of Conventional Type Vehicle Front engine rear wheel drive

Vehicle Dimensions Wheelbase, wheel track, front & rear overhang, overall dimensions, ground clearance.

Unit II

Vehicle Transmission and Suspension System Transmission system, as the name suggests transmits the power produced by the engine or motor to the wheels. Further this transmission process enables the movement of the vehicle. The current topic discusses the transmission system as well as the Suspension System.

Suspension system is used to reduce the road vibrations and at the same time to increase the road holding/handling capabilities of the vehicle. The topic discusses the major components of the Suspension system.

Gear Box Functions and types of gearbox and Clutch

Suspension System – leaf spring and coil spring

Final Drive Functions

How helicopters and drones work

Unit III

Braking Systems Purpose, principle of braking, stopping distance, layout of braking system components, classification of brakes, requirements of a good braking system.

Wheels Requirements of wheel, various types and materials advantages & disadvantages.

Tyres. Functions of tyres, tubed and tubeless tyre, materials of tyres, Desirable tyre properties

Vehicle Structure & Materials The topic briefly talks about the major components of a Vehicle Structure and understand their impact in designing a vehicle. Also, a study of materials related to the structure is done. More detailed study of materials will be done in the next semester.

Frame Function of frame, loads on frame, frame construction, sub-frame, defects in frame chassis repair and alignment, frameless construction

Briefly explaining working of: aircrafts, Mag-Lev trains, hyperloop

List of Experiments:

1. To draw a layout of vehicle showing various parts of the body
- 2.
3. Assignment to draw a vehicle and describe what all materials are being used for different parts of the vehicle construction
4. Interior body parts nomenclature exercise
5. Interior sketch and description
6. Types of vehicles bodies' assignment.

Recommended Books:

- Automobile Engineering Vol. 1 & 2 by Kirpal Singh
- IC Engines by Mathur and Sharma

APD104: COLOUR THEORY

LTP 104

Pre-Requisites: N.A

Course Objectives:

1. Students will develop the fundamental skills to create and improve artwork or design product by manipulation of media and techniques.
2. Students will develop the fundamental knowledge and skills to express themselves aesthetically and creatively through colour.
3. Students will develop the ability to use colour in sophisticated problem solving assignments.
4. Students will develop the ability to recognize and create/manipulate specific colour harmonies and contrasts.

Contents:

Unit I

- Introduction, what are colours? How colours are made
- Colour wheel
- Primary, secondary & tertiary colours
- Colour mixing

Unit II

- Warm & cool colours
- Hue, value and saturation
- Tint, tone and shade
- Colour schemes- monochromatic, complimentary, analogous, split complimentary, triadic, tetradic

Unit III

- Bezold effect
- Colours on a product, matte-glossy
- Visual impact of colours and proportion
- Psychological and symbolic use of colour

Assignments

1. Make a colour wheel on a paper using water colours and understand colour mixing.
2. Make tints, tones and shades of any one colour.
3. Visit a Super Market and Choose 10 different products and make a presentation about the colours and combination of colours of the products.
4. Identify 3 real life problems that can be solved by use of right colours, in day to day activities.

Recommended Books/ Online Reference

1. Color Design Workbook by Sean Adams & Terry Lee Stone
2. Interaction of Color by Joseph Albers
3. The Art of Color by Johannes Itten

APD105: ELEMENTS OF DESIGN

LTP 214

Pre-Requisites: N.A.

Course Objective:

In this subject, the students are taught a sense of Visual Understanding in Aesthetics and Fundamental rules of design perception.

Contents:

Unit I

1. Your Reptilian brain
2. Acquired Taste
3. Radian manipulation
4. Merging shapes or shape transition

Unit II

5. Design Communication and Gestalt Laws
 - a. Eye tracking, 9 Principles of Gestalt
 - b. Visual Balance, Colour and Unity, Variety and Complexity

Unit III

6. Visual Semantics
 - a. Terms, Expressing motion, colour and Semantics
 - b. Context and Framing, Rhetoric and Audience.
7. Holistic Approach to Design
 - a. The Process of Perception

Unit IV

8. Human Factors and Ergonomics
 - a. Anthropometrics, Psychological and Physiological Factors
9. Resource Management and Sustainable Production
 - a. Renewable, Reuse, Recondition, Recycle, Energy Utilization, Clean Green and Eco Design
10. Innovation and Design
 - a. Invention and Innovation, Intellectual Property
 - b. Classic Design

List of Experiments

1. Ads with a Meaning Presentation
2. Design and Packaging case study
3. Semantics study with traffic lights case study
4. Design Communication in Visual Rhetoric Context

Texts/Reference:

1. Gail Greet Hannah, Elements of Design, Princeton Architectural Press, 2002
2. Itten, Johannes; The Art of Color: The Subjective Experience and Objective Rationale of Color, Wiley Publications, 1997
3. Kepes, Gyorgy; Language of Vision, Dover Publications, 1995
4. Elam, Kimberly; Geometry of Design: Studies in Proportion and Composition, Princeton Architectural Press, 2001
5. Lawlor, Robert; Sacred Geometry: Philosophy and Practice (Art and Imagination), Publisher: Thames & Hudson, 1989
6. Hall, Edward Twitchell; The Hidden Dimension, Publisher: Anchor; Reissue edition, 1990
7. Bachelard, Gaston; Jolas, Maria (Translator); The Poetics of Space, Publisher: Beacon Press; Reprint edition, 1994
8. Livio, Mario; The Golden Ratio: The Story of PHI, the World's Most Astonishing Number, Publisher: Broadway, 2003
9. Jute, Andre; Grids: the structure of graphic design. Crans-Pres-Celigny: Rotovision, 1996.

ABILITY ENHANCEMENT CUM POLSORY COURSE 1
COM101: ENGLISH COMMUNICATION
LTP 200

Pre-Requisites: N.A.

Course Objective:

1. To make student Understand how communication works.
2. Gaining active listening and responding skills.
3. Seeing things from other points of view.

Contents:

Parts of Speech
Tenses
Listening Skills
Speaking Skills
Reading Skills
Writing Skills
Determiners
Antonyms- synonyms
Homophones & Homonyms

Internet Links:

<https://www.englishgrammar101.com/>
<http://learnenglish.britishcouncil.org/en/english-grammar>
<http://www.englishgrammarssecrets.com/>
<http://www.myenglishpages.com/>
<http://www.talkenglish.com/>
<http://www.englishforeveryone.org/Topics/Reading-Comprehension.html>

COM121: ENGLISH COMMUNICATION LAB
Credits: 1
LTP 002

Course Description: The course aims to equip the students with focus on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations both in formal and informal contexts.

The course includes description of sights seen in everyday life, pronunciation of different words and its correct usage.

Course Outcomes (CO):

Upon successful completion of the course, the students should be able to:

CO1: Better understanding of nuances of English language through audio- visual experience and group activities

CO2: Speaking skills with clarity and confidence enhancing their employability skills

CO3: Better comprehension of speech of people of different backgrounds and regions.

CO4: Ability to use English grammar accurately.

Course Content

1. Daily Discourse: Common Everyday Situations: Conversations and Dialogues (Unit 1-6), Monologue (2D/4D/5D/6D), and Communication at workplace.
2. Listening skills on Social Interactions (Unit 1), work and study (Unit 2), daily life (Unit 3), food (Unit 4), Places (Unit 5) and Family (Unit 6)
3. Phonetic Skills: Pronunciation, Intonation, Stress (Unit 1-6) and Rhythm
4. Speaking Skills: Group Discussion / Debate, Role Plays

Recommended Books / Suggested Readings:

1. *Cambridge English Empower Elementary Student's Book* by Cambridge University Press On *Writing Well*. William Zinsser. Harper Resource Book. 2001
2. *Exercises in Spoken English*. Parts. I-III. CIEFL, Hyderabad. Oxford University Press
3. *Study Writing*. Liz Hamp-Lyons and Ben Heasley, Cambridge University Press. 2006.
4. *On Writing Well*. William Zinsser. Harper Resource Book. 2001

SEMESTER II
APD106: ENGINEERING DRAWING
LTP 104

Pre-Requisites: N.A

Course Objectives:

1. A product once designed needs to be produced. In practical circumstances, the producer is different from the designer and hence the design has to be communicated to him.
2. This mode of communication, aimed at production of the product, is known as 'engineering drawing'.
3. It gives all the details regarding the product – mainly its dimensions, material specifications, assembly line etc. This course is the first step towards learning how to communicate for production purpose.

Contents

Unit I

- Basics of drafting practice and standard nomenclatures

Scale

Concept of scale, engineers scale, graphical scale, Representative fraction, how to draw scales

- Technical constructions

Bisect a line, draw perpendiculars, draw parallel lines, divide a line, divide a circle, bisect angle, trisect an angle, find center of an arc, reverse curves, draw any polygon, regular polygons inscribed in a circle, tangent to a circle through a point in/out of it, common tangent to given circles of equal/unequal radii, determine length of given arc,

Unit II

- Orthographic projections – horizontal plane, projection plane, six views of a given object, three standard views, views of simple objects, dimensioning, line thicknesses
1. What is a projection? What is projection plane? horizontal and vertical planes,
 2. projection of a point,
 3. line, inclined line, on different planes,
 4. lettering, dimensioning, true length of inclined line

Unit III

1. Systems of projection - First angle and third angle projection systems
2. Projections of simple solids
 - Isometric Projection
 - Introduction to isometric axes, lines and planes. Isometric drawing of different objects.

Unit IV

- Orthographic Projection of Interpenetrating Objects
- Perspective/ Isometric of Interpenetrating Objects

List of Experiments

1. Drawing practice for lettering in SINGLE, DOUBLE and INCLINED in both (capital and small letters).
2. General principles of dimensioning on technical drawing.
3. Drawing practice of scale (Reducing, Enlarging and normal scale).
4. Drawing practice for projection of point, line & plane.
5. Drawing practice for isometric projection.
6. Drawing practice for front view, top view and side view from 3D drawing.
7. Drawing practice for conversion of 2D from 3D drawing.

References:

1. Engineering Drawing, by P.S. Gill, S. K. Kataria & Sons
2. Elementary Engineering Drawing [Plane and Solid Geometry], by N.D. Bhatt, Charotar Publishing House

APD108: INTRODUCTION TO DIGITAL SKETCHING

LTP 102

Pre-Requisites: N.A

Course Objectives:

This module introduces the world of digital sketching through a Pen Tablet and software like Photoshop and Sketch book.

Students will be working on various exercises and creating mini projects within each topic while learning the advanced techniques of sketching and rendering tools. The understanding and skill learning exercises done here would be further used to create a major project of the semester.

Contents

Unit I

- Introduction to Wacom tablet
- Introduction to Photoshop, sketchbook pro interface and Alias Sketchbook. Keyboard shortcuts,
- Detail description and demonstration of various tools.

Unit II

- Sketching practice on digital pad
- Layers and blend modes,

Reference Books:

1. Photoshop for dummies; Author: Peter Baurer.
2. Adobe Illustrator CS6 Classroom in a Book: The Official Training Workbook from Adobe Systems,
Author: Adobe Creative Team.
3. Carbodydesign.com
4. Cardesignnews.com
5. Simkom.com
6. Youtube.com for tutorials on sketching and rendering.

APD109: PRODUCT DESIGN PROCESS

LTP 300

Pre-Requisites: N.A

Course Objectives:

5. The students are introduced to the world of product design and are given information and knowledge about the various steps and process involved in design of products.
6. Techniques in brainstorming, design development, presentation and problem solving are discussed in detail.
7. Students primarily observe various guest designers and experts while participating in some design work of their own.

Contents:

Unit I

- Introduction, Problems and Solutions, What is Good Design? Design as Model-Making. Design and Needs, Designing as Heuristic Problem-Solving, Design, Creativity, Invention and Innovation.

Unit II

- Product and its types
- Product development process
- Six phases of Product Design
- Product Types
- The Life of a Product

Unit III

- Form and Function
- The Golden Triangle
- The Design Paradox
- Design Process Evaluation
- The Over the Wall Design Method
- Concurrent Engineering
- Members of Design Team.

Assignments

5. Visit a Super Market and Choose 10 different products and make a presentation about the usefulness of the product.
6. Identify 10 real life problems that can be solved by design, in day to day activities.
7. Identify 5 social problems in day to day life and reason a plan to solve the problems in writing.
8. List the design problems solved in Philip Staarc episode of Design for a better Living video Series.

Recommended Books/ Online Reference

1. Product design @ <https://alison.com/courses>
2. Product Design by Dr Abdullah F.Al-Diwari
3. The Design of Everyday things by Don Norman.
4. Product Design and Development by Karl Ulrich and Steven Eppinger.

SKILL ENHANCEMENT COURSE 1
APD111: ORGANIC SKETCHING IN PRODUCT DESIGN
LTP 106

Pre-Requisites: APD102

Course Objectives:

The objective of this course is to impart the practical knowledge about the basic element of Art, Drawing, Free Hand Sketching, Anatomy, Volume, Space, Texture and Color.

Contents:

Unit I

Fundamental of Drawings: learning weigh and balance, proportion, foreshortening, Stick figure drawings, Gesture drawing, Action figure drawings and silhouette drawing.

Unit II

Outdoor Sketches: Landscape, plants study, illustration of railway, bus stand and college life.

Perspective: An Introduction to perspective design, Linear and Aerial Perspective.

Unit III

Anatomy study: An Introduction to Human study, the head and neck, Torso, arm, hand, legs and foot sketching.

Unit IV

Color theory: An Introduction to Volume study, Light and shade study. Types of colors: Primary colors, secondary colors, Tertiary colors, Color wheel, Color scale and color schemes.

Practical/Submission:

1. Stick figure drawing in action.
2. Sketch of human hand, foot and torso.
3. Outdoor Drawing.

Recommended Books:

1. Lazzari, Margaret R, (March 1990), Art and Design Fundamentals, Van Nostrand Reinhold.
2. Barber, Barrington, (August 1, 2011), Drawing Anatomy, Arcturus Publishing.
3. Sanmiguel, David, (March 28, 2006), Art of Still Life Drawing, Sterling; 18954th edition.

SEMESTER 3
APD201: AUTOMOTIVE& PRODUCT MATERIALS
LTP 210

Pre-Requisites: APD103

Course Objective:

- The materials used in products and in automotive sector have been carefully selected based on different characteristic requirements and regulations.
- To study different types of materials based on aesthetic value, mechanical strength, manufacturing ease, cost of production
- To understand reusability, environment friendly and sustainability of different materials

Contents

Unit I

- Introduction
- General Introduction to Materials and Classification.
- Man-made and Natural materials , Properties and Uses
- Car Construction Materials
- History of Frames and Materials

Unit II

- Timber, Constructions, Classification and Types , Uses
- Glass, Classification, Properties ,Types and Uses
- Ceramics , Classification , Properties , types and Uses
- Materials used In Automobile Construction
- Polymers vs. Metals, Application, Types and Advantages
- Sheet Molding Compound, Application, Body panels, Windshield, Tires
- Composites in Automobiles, Application, Properties, Use.

Unit III

- Plastics, Thermosetting and Thermoplastics and Uses
- Composites
- Materials of the Future , Smart Materials, Future Material Requirements
- Self-healing, Coating, Memory Materials, Electro responsive materials
- Solar Materials, New E conductive Materials and energy storage.

Unit IV

- Future Trends in Design
- a. Sustainability, Weight Reduction, Recyclable materials, Bio Materials and Rapid Manufacturing.
- b. Inspired by Nature, Floating Elements, sculpted Surfaces, Individuality, multi-functionality
- c. Autonomous Electric Drawings and Self Driving Cars.

List of Experiments:

1. Material Sample study
2. Presentation on Future Trends in Design
3. Smart Material study
4. Composites in Design Context for Automobiles Study
5. Polymers in Design Context for Automobiles / Product Study

Reference:

1. Advanced Technology for Design and Fabrication of Composite Materials and Structures: Applications to the Automotive, Marine, Aerospace and ... Applications of Fracture Mechanics) by George C. Sih (Editor), Alberto Carpinteri, G. Surface.
2. Automotive Materials: Technology Trends and Challenges in the 21st Century by Alan I. Taub.
3. Advance Materials in Automotive Engineering, by Jason Rowe.

APD202: MANUFACTURING PROCESSES

LTP 008

Pre-Requisites: N. A.

Course Objective:

Workshop Skills teaches the students to work with MDF, thermocol, HIPS, Plaster of Paris, regular clay and understand basics of model making and how these materials are.

To gain proficiency in hand modeling, students will be given mini projects to create the models. With the help of various workshop tools, student would create their own model of a small size. The ideas student perceive in other subjects may be used to create a physical model in this subject.

Course Content

Unit I

- Preparation of side technical view of Concept/reference model.
- Preparation of Plan to go about the model
- Introduction to Tools , workshop machines

Unit II

- Surface preparations
- Features Preparation and Details
- Basics of product Photography

The students are asked to do a replica of an existing handheld product so as to understand tools and material. Students will learn how to give desired shapes according to design, while working in any material.

Pre-Requisites: N.A.

Course Objective:

- To train students to create their projects in 3D product design Modelling softwares like Solidworks, Rhino, CREO and CATIA depending on current Industry standards and ease of use.

Contents:

Unit I

- Introduction to ALIAS Product Design, CATIA /Rhinceros /CREO /Solid Edge
- Interface and Workspace
- Move, Pan and Rotate Objects
- Tool bars Description
- Basic tools

Unit II

- Creation of Simple Elements like Point, Line, circle, Arc, Ellipse
- Creation of Sketches
- Basic Volumes Construction like Cube, Cylinder, Sphere, Cone

Unit III

- Creation of Surfaces
- Editing Objects
- History and Edit of Curves

Unit IV

- Use of Square tool, Skin, B rail tools
- Extrusion, Sweep, Revolve and other features
- Trimming, Intersection and Projection of Curves
- Working with advanced features (intersection, union, trim)

References:

1. Inside Rhinoceros 5 by Ron K.C. Cheng
2. Working with Rhinoceros 5.0 by Michiel van der Kley
3. Rhino NURBS 3D Modelling by McNeel & Associates
4. Inside Rhinoceros 4 by Ron K.C. Cheng\

Pre-Requisites: APD108

Course Objective:

Further continuation of Introduction to Digital Sketching.

In this module, the student will be thoroughly acclimatized with all the tools and learn important shortcuts and techniques, while honing their skills in the softwares.

Course Contents:

Unit I

- Types of selection tools
- Brush settings
- Paths study and practice

Unit II

- Image adjustments
- Introduction to filters
- Introduction to color wheel

Unit III

Tips and tricks.

- Adjusting Image.
- Using level, curve tools
- Free transform editing of sketch
- Importance of using Flip to check the sketch perspective

Tutorial

Demo of a car side view sketch and render; product sketch and render.

Reference:

1. Photoshop for dummies; Author: PeterBaurer
2. Adobe Illustrator CS6 Classroom in a Book: The Official Training Workbook from Adobe Systems [With CDROM]; Author: Adobe Creative Team.
3. Carbodydesign.com

APD305: DESIGN PROJECT I
LTP 214

Pre-Requisites: APD109, APD201

Course Objective:

At the end of each semester, the student is expected to undertake a design project and execute it. Here the learning acquired in the past semesters is to be utilised. The project aims to prepare the student solve a design problem in totality. The first of its type, this project is focused on simple design problems of our day to day life. The student is to apply his knowledge of sketching, Materials and Research and create a new product, which should bring a new value and proposition to the customer

Course Contents:

Unit I

- Project brief
- Analyze environments and locate need oriented problem
- Information collection.

Unit II

- Analysis of existing solution/s
- Specify areas of design improvement

Unit III

- Concept formulation
- Develop solution
- Presentation – document, technical drawings, renderings, and mock up model

ABILITY ENHANCEMENT CUM POLSORY COURSE 2
ENS001: ENVIRONMENTAL STUDIES
LTP 200
Credit : 2

Course Description: This course deals with the environment components, ecosystems and how to maintain equilibrium in nature, its conservation, and different methods to reduce pollution and maintain our nature.

Course Learning Outcomes: After completion of this course, student will be able to

CO1: Understand about environment, its role and importance for living beings.

CO2: Understand the structure of ecosystem, food chain/ web.

CO3: Understand about the natural resources and their uses.

CO4: Understand about different types of pollution created by human beings and their side effects as well as the methods to reduce these pollutions and their alternatives.

Course Contents:

Unit I

Introduction to environmental studies

Multidisciplinary nature of environmental studies: components of environment–atmosphere, hydrosphere, lithosphere, and biosphere.

Scope and importance: Concept of sustainability and sustainable development.

Ecosystems

What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chain, food web and ecological succession. Case studies of the following ecosystems:

- a) Forest ecosystem
- b) Grassland ecosystem
- c) Desert ecosystem
- d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit II

Natural Resources: Renewable and Non-renewable Resources

- Land Resources and land use change; Land degradation, soil erosion and desertification.
- Deforestation: Causes and impacts due to mining, dam building on environment, forests,

biodiversity, and tribal populations.

- Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state).
- Heating of earth and circulation of air; air mass formation and precipitation.
- Energy resources: Renewable and non-renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Biodiversity and Conservation

- Levels of biological diversity: genetic, species and ecosystem diversity; Biogeography zones of India; Biodiversity patterns and global biodiversity hot spots
- India as a mega-biodiversity nation; Endangered and endemic species of India
- Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.
- Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit III

Environmental Pollution

- Environmental pollution: types, causes, effects and controls; Air, water, soil, chemical and noise pollution
- Nuclear hazards and human health risks
- Solid waste management: Control measures of urban and industrial waste.
- Pollution case studies.

Environmental Policies & Practices

- Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture.
- Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act; International agreements; Montreal and Kyoto protocols and conservation on Biological Diversity (CBD). The Chemical Weapons Convention (CWC).
- Nature reserves, tribal population and rights, and human, wildlife conflicts in Indian context

Unit IV

Human Communities and the Environment

- Human population and growth: Impacts on environment, human health, and welfares.

- Carbon footprint.
- Resettlement and rehabilitation of project affected persons, case studies.
- Disaster management: floods, earthquakes, cyclones, and landslides.
- Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan.
- Environmental ethics: Role of Indian and other religions and cultures in environmental conservation.
- Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

**** Field work**

- Visit to an area to document environmental assets; river/forest/flora/fauna, etc.
- Visit to a local polluted site – Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds, and basic principles of identification.
- Study of simple ecosystems-pond, river, Delhi Ridge, etc.

Suggested Readings:

1. Carson, R. 2002. Silent Spring. Houghton Mifflin Harcourt.
2. Gadgil, M., & Guha, R.1993. This Fissured Land: An Ecological History of India. Univ. of California Press.
3. Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
4. Gleick, P.H. 1993. Water in Crisis. Pacific Institute for Studies in Dev., Environment & Security. Stockholm Env. Institute, Oxford Univ. Press.
5. Groom, Martha J. Gary K. Meffe, and Carl Ronald Carroll. Principles of Conservation Biology. Sunderland: Sinauer Associates, 2006.
6. Grumbine, R. Edward, and Pandit, M.K. 2013. Threats from India's Himalaya dams. Science, 339: 36-37.
7. McCully, P.1996. Rivers no more: the environmental effects of dams (pp. 29-64). Zed Books.
8. McNeil, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.
9. Odum, E.P., Odum, H.T. & Andrews, J.1971. Fundamentals of Ecology. Philadelphia: Saunders.
10. Pepper, I.L., Gerba, C.P. & Brusseau, M.L. 2011. Environmental and Pollution Science.

Academic Press.

11. Rao, M.N. & Datta, A.K. 1987. Wastewater Treatment. Oxford and IBH Publishing Co. Pvt.

Ltd.

12. Raven, P.H., Hassenzahl, D.M. & Berg, L.R. 2012. Environment. 8th edition. John Wiley & Sons.

13. Rosencranz, A., Divan, S., & Noble, M.L. 2001. Environmental law and policy in India. Tripathi 1992.

14. Sengupta, R. 2003. Ecology and economics: An approach to sustainable development. OUP.

15. Singh, J.S., Singh, S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand Publishing, New Delhi.

16. Sodhi, N.S., Gibson, L. & Raven, P.H. (eds). 2013. Conservation Biology: Voices from the Tropics. John Wiley & Sons.

17. Thapar, V. 1998. Land of the Tiger: A Natural History of the Indian Subcontinent.

18. Warren, C.E. 1971. Biology and Water Pollution Control. WB Saunders.

19. Wilson, E.O. 2006. The Creation: An appeal to save life on earth. New York: Norton.

20. World Commission on environment and Development. 1987. Our Common Future. Oxford University Press.

21. www.nacwc.nic.in

22. www.opcw.org

SEMESTER IV

APD205: DESIGN RESEARCH

LTP 110

Pre-Requisites: N.A.

Course Objective:

- Research is an essential part of any design project. The students will require conducting research during different parts. The outcome of the research can be used for documentation or for the purpose of conceptualizing a new product. Students need to be aware of different methodologies for conducting research.
- The students will conduct a detailed user research or an ethnographic research to identify opportunities for understanding the requirements of a new product or an existing product. The students will prepare a research document.

Course Content:

Unit I

- Deductive approach and Inductive approach
- Preparing a research proposal
- Generating research questions and hypothesis and validity

Unit II

- Research Methodology: Quantitative Approaches
- Research Methodology: Qualitative approaches
- Literature Survey and search process
- Data Collection and evaluation

Unit III

- Triangulation and reliability of inferences
- Structure of an academic article
- Analysis
- Documentation

List of Experiments:

1. Submission of Intended topic to be researched upon .Pros and cons w.r.t Market availability of the product.
2. Presentation of Research topic Draft
3. Final Presentation of the Research and Thesis to be submitted in soft and hard copy.

References:

1. Saunders, Lewis & Thornhill (2003) Research Methods for Business Students .Pearson
2. Blaxter, L. and Hughes, C. (1996) How to Research.
3. Burns, R. B. (2000) Introduction to Research Methods. Sage.
4. Bell, J. (1997) Doing your Research Project: a guide for first-time researchers in education. Open University Press.
5. Coffey, A. (1996) Making Sense of Qualitative Data: Complimentary Research Strategies. Sage.
6. Dey, I. (1993) Qualitative Data Analysis. Routledge.
7. Denzin, N.K. and Lincoln, Y.S. (eds.) (1994) Handbook of Qualitative Research. Sage.
8. Mason, J. (1996) Qualitative Researching. Sage.
9. Oppenheim, A.N. (1992) Questionnaire Design: Interviewing and Attitude Measurement. Pinter New Edition.
10. Yin, R.K. (1994) Case Study Research. Sage.

APD206: PRODUCT DESIGN MODELLING II**LTP 104**

Pre-Requisites: APD203

Course Objective:

This is the continuation and final Modelling lab for the students to create simple product design models in a quick and efficient way. Students will be taught to render products in real time and apply materials to products. An introduction to 3d printing Technology, which is a form of Rapid Prototyping, is also included in this module.

Contents:**Unit I**

Introduction: Need for additive manufacturing, Development of Additive manufacturing systems, Ideal Design Cycle, Critical Design Cycle, Impact of rapid prototyping on Product Development, Virtual Prototyping, Rapid Tooling, comparison between rapid prototyping and CNC, Additive process comparison between various RP methods, Rapid Tooling, Rapid manufacturing, Applications and future of Additive Manufacturing.

Unit II

Working with the Prototyping Machine: Introduction to printed model properties: Setting layer resolution, material packing in model, support material packing, making duplicate part entities, model STL unit setting, model size scaling. Model orientation for minimum manufacturing time, support material and model material usage optimization, using auto orient for maximum material and time optimization, part orientation for maximum strength, part orientation for maximum accuracy, user defined model orientation, managing stl file angle for optimized machine table usage. Adding the oriented model to pack, verification and analysis of model material usage, support material usage, machine running time, Generating CMB file using the CATALYST software for printer initiation command, managing printer history and export configuration file.

List of Experiments:

1. Practical Implementation and comparison of various Rapid Prototyping Technologies.

2. Practical Demonstration of FDM Printing.
3. To import CAD STL file of the part to be printed in Catalyst Software and set part orientation, units and scale.
4. To add the print model to pack and analyze model and support material requirement and time consumption for the printer.
5. To prepare the Work Table and set up the Material Cartridges in Dimension SST 1200ES for proper loading and unloading.
6. To send the print file to FDM Machine and produce the RP Model.
7. To perform machine maintenance and verify the stable condition of machine nozzles.

References:

1. Additive Manufacturing technologies, by Ian Gibson, David Rosen and Brent Stucker
2. 3D Printing, by Kalani Kirk Hausman and Richard Horne
3. 3D Printing, by Christopher Barnett

APD207: CLAY MODELLING I

LTP 004

Pre-Requisites: N. A.

Course Objective:

Clay Modeling 1 teaches the students to create their own non-working prototypes using Automotive Clay. The process of using clay has been in the industry since the very beginning. To gain proficiency in hand modeling, students will be given mini projects to create the models. With the help of various clay tools, student would create their own concept of a small size. The ideas student perceive in other subjects may be used to create a physical model in this subject.

Course Content

Unit I

- Preparation of side technical view of Concept/Idea in 1:16 Ratio.
- Preparation of Plan view support for Deposition of Clay
- Introduction to Tools , Tapes
- Wooden base support preparation.
- Wheels preparation

Unit II

- Preparation of Polystyrene base in side view
- Deposition of Initial clay
- Scrapping and removal of clay

Unit III

- Surface preparations
- Features Preparation and Details
- Basics of product Photography

SKILL ENHANCEMENT COURSE 2
APD112: ERGONOMICS AND PACKAGING
LTP 212

Pre-Requisites: N. A.

Packaging of products and vehicles

Course Contents

Vehicle packaging deals with the overall envelop in which occupants of a vehicle are placed while using a vehicle, along with the basic dimensions needed to be kept static while designing any vehicle. The subject Vehicle Packaging and Architecture specifically teaches the design student to create and understand a vehicle layout to create an impressive, technically correct and efficient vehicle.

The Architecture part of the subjects deals with various types of segments and fabrication techniques and methods. It deeply talks about the function of design in creating market segments and vice versa.

Course Content

Unit I

Getting Started

Systems & Market Segments, Anatomy of the package, Quick step-by-step process, Sections, Grid & ground lines, Main package Hand points, Package Logic Drawings, Setting Functional Objectives

Unit II

Functions & Segments

Market Segments, Sketching Conceptual Packages

Unit III

Package Ideation

Occupant Mannequin Introduction (5th percentile and 95th percentile)

Occupant Packaging

Mannequin Anatomy, Mannequin & Occupant Environment Set-up, Introduction to Interior System

Unit IV

Interiors & Cargo

Instrument Panel & Control Basic Set-up, Seat Design, Interior Volumes & Cargo Storage, Powertrain Anatomy

Powertrains

Selecting a Powertrain, Layouts & Configurations

Assignments

1. Creating mannequin (in scale) and how they deal with products
2. Making hands in thermocol and understanding how they deal with handheld products

Reference Books

1. Introducing Autodesk Maya 2014: Autodesk Official Press by Dariush Derakhshani
2. Learning Autodesk Alias Design 2012 by Prof. Sham Tickoo Purdue Univ. and CAD/CIM Technologies
3. Autodesk Maya 2013 Essentials by Paul Naas

DISCIPLINE SPECIFIC ELECTIVE 1

LTP 114

Pre-Requisites: NA

This is a Discipline specific Elective. The student is free to choose his field of interest from **Car, Bike, Product or Interior Sketching**. Only one subject of interest is taught in the each elective. There are a total of 4 DSE and the student is free to build on the expertise level of the first subject by taking 2nd part of same field or choose a different field of interest in the remaining three DSE.

It is a further continuation of Advanced sketching of products/ Automobiles in various perspectives and angles. It is the fundamental study for the final Design projects in the coming semesters.

ELECTIVES LIST

Pre-Requisites	Course Code	Course Name
N.A	APD 120	Car design sketching 1
N.A	APD 121	Bike design sketching 1
N.A	APD 122	Interior Sketching 1
N.A	APD 123	Product design detailing 1
APD 120	APD 220	Car design sketching 2
APD 121	APD 221	Bike design sketching 2
APD 122	APD 222	Interior Sketching 2
APD 123	APD 223	Product design detailing 2

Contents:

Unit I

1. Basic side view with Epsilon line
2. Advanced side view with details in front and back of object in Plan view.
3. Shading of the Object
4. Importance of character line
5. Importance of One point perspective side view sketches

Unit II

1. 3 Quarter Front view on Flat Horizontal line
2. Using Vanishing Points
3. Orientation of Ellipses in 3 Quarter Perspective
4. Shading of Object w.r.t Angle of Incidence of Light
5. Shading value and contrast in the Object
6. Shadow and background Importance in sketches

Unit III

1. 3 Quarter Back View

Unit IV

1. Tip Top view
2. Drawing objects in varying 3d Perspective Angles.

APD306: DESIGN PROJECT II
LTP 214

Pre-Requisites: APD109, APD201

Course Objective:

The students will be given a medium difficulty level open design project where he/she will be expected to design a new vehicle/product for the specific given theme. The project will utilize the skills acquired in the other subjects taught during the course.

The outcome of this project will be expected in the form of free hand sketches and marker/digital renders.

The timeline and professional level of completion of the said project will enable the students to work as per the industry standards followed globally.

Design project

- Project Declaration, mood board & story board creation, concept generation, ideation and concept development, sketching around the concept, Ideation and development, Renderings
- Final presentation

Reference Books:

1. Design Research: Methods and Perspectives by Brenda Laurel and Peter Lunenfeld.
2. Research Design: Qualitative, Quantitative and Mixed Methods Approaches by CRESWELL.
3. 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization by Vijay Kumar.

SEMESTER V
APD301: DIGITAL SURFACING I
LTP 104

Pre-Requisites: N.A.

Course Objective:

Digital Sculpting or 3D modeling is an essential part of the design industry. With the emergence of various design software, the process of designing and production of designed products has taken a huge leap. The design industry has an extreme need of designers with software knowledge.

To ensure that the students have a hands-on experience with various software, DIGITAL SCULPTING has been introduced, concentrating on extensive teaching of Autodesk Alias Studio.

The teaching will be based on regular exercises where the students will be expected to deliver high level of 3D models.

Course Content

Introduction to Interface

Unit I

- Navigation, Pan, Zoom and rotate objects.
- Marking Menu Description and use
- Introduction to tool bar and control panel
- Layers and object lister
- History and Query Edit

Unit II

- Introduction to different views
- Setting up Canvas plane
- Setting up basic new file properties, units, grid spacing and sub division

Unit III

- Using the command bar
- Introduction to Absolute and Relative dimensioning
- Degree and CV of a curve

- Edit point and CV curve
- Curve curvature use

Unit IV

- Introduction to surfaces and hull
- Using snap with the mouse and its settings
- Curve tools, Object tools, Surface tools Introduction

Modeling with Primitives

- Table and lamp
- Rendering options

Additive Design

- Modeling with curves
- Boat

Subtractive Design

- Trim and Fillet
- Wheels

Industrial Design

- Rail and rolled edges
- Mobile Phone

Texturing

- Camera effects
- Shader effects
- Light effects

Basic Transportation Design

- Automotive Surfaces
- Car

References

1. Learning studio tools from Autodesk Website help
2. Autodesk technical Surfacing, 2008
3. Learning Design with Alias R StudioToolsTM
4. A Hands-on Guide to Modeling and Visualization in 3D, Fridolin T. Beisert
5. Learning Autodesk Alias Design 2012 by Prof. Sham Tickoo Purdue Univ. and CAD/CIM

Technologies

6. Online tutorials from YouTube
7. Carbodydesign.com

APD116: GRAPHIC DESIGN & PORTFOLIO DESIGN

LTP 220

Pre-Requisites: N. A.

Course Objective:

The students are taught how to put together their projects in a sequence of captivating the interest of the Interviewer. The Portfolio should contain all the students' best works of his/her. It's the main source of showing his work to the world.

Course Content

Unit I

1. Introduction to graphic design.
2. Graphic design rules
3. Introduction to Font styles

Unit II

4. Colour and layout design of the Portfolio

Unit III

5. Preparation of CV
6. Organizing design projects

APD302: CLAY MODELING II

LTP 202

Pre-Requisites: APD207

Course Objective:

This is a continuation of Clay Modeling I. It consists of pure practical hands on craft and technique of sculpting clay to get the students intended design on paper to a real physical model in scale.

Course Content

Unit I

1. Making of wheels in wood
2. Creation of wooden platform w.r.t wheel base of the car.
3. Preparation of side view w.r.t scale
4. Base preparation with Polystyrene

Unit II

5. Use of tape to draw and shape characteristic lines and sculpt surfaces
6. Practice sculpting with various tools
7. Understand how volumes, proportion and scale work and visualize the product in real life scenario.
8. Checking the model for surface imperfections and correcting it.

List of Experiments

1. Create a 1:16 scale car of your choice.
2. Presentation of the completed model with design sketchbook, and presentation on foam board.

GENERAL ELECTIVE 1**LTP 114****Unit III**

Pre-Requisites: N.A.

Course Objective:

In this module the students are given a pool of subjects to choose from, which are selected by the educational course committee.

The students learn to explore design solutions to various problems and fields, and solve them through design. The students are encouraged to think for the future. They are taught to critically think and cultivate a habit of free spirit and positive thinking. This is a design exercise which prepares them for the upcoming reality situations in their life.

- Marker or software renders
- Final Presentation

Pre-Requisites	Course Code	Course Name	Contact Hours			Credits
			L	T	P	
N.A	APD124	Inter disciplinary project	1	1	4	4
N.A	APD125	Shoe design	1	1	4	4
N.A	APD126	Toy design	1	1	4	4
N.A	APD127	Social project	1	1	4	4
N.A	APD128	Storytelling and design	1	1	4	4
N.A	APD129	Everyday function	1	1	4	4
N.A	APD130	Sci Fi Project yr 2050	1	1	4	4
N.A	APD131	Smart Watch Design	1	1	4	4
N.A	APD132	Yacht design	1	1	4	4
N.A	APD133	Mass Transport	1	1	4	4
N.A	APD134	3 wheeler design	1	1	4	4

Contents:**Unit I**

- Research of customer profile
- Research about current Market competitors
- Inspiration and Mood Board

Unit II

- Ideation sketches
- Product Screening
- Final Sketch development

DISCIPLINE SPECIFIC ELECTIVE 2

LTP 114

Course Objective:

This is a Discipline Specific Elective that has to be chosen in continuation of the same subject which was selected as Discipline Specific Elective 1. The student is free to choose his field of interest from **Car, Bike, Product or Interior Sketching**. Only one subject of interest is taught in each elective.

There are a total of 4 DSE and the student is free to build on the expertise level of the first subject by taking 2nd part of same field or choose a different field of interest in the remaining three DSE.

It is a further continuation of Advanced sketching of products/ Automobiles in various perspectives and angles. It is the fundamental study for the final Design projects in the coming semesters.

ELECTIVE LIST.

Pre-Requisites	Course Code	Course Name
N.A	APD 120	Car design sketching 1
N.A	APD 121	Bike design sketching 1
N.A	APD 122	Interior Sketching 1
N.A	APD 123	Product design detailing 1
APD 120	APD 220	Car design sketching 2
APD 121	APD 221	Bike design sketching 2
APD 122	APD 222	Interior Sketching 2
APD 123	APD223	Product design detailing 2

Contents:

Unit I

6. Basic side view with Epsilon line
7. Advanced side view with details in front and back of object in Plan view.
8. Shading of the Object
9. Importance of character line
10. Importance of One-point perspective side view sketches

Unit I

Contents:

6. Basic side view with Epsilon line
7. Advanced side view with details in front and back of object in Plan view.
8. Shading of the Object
9. Importance of character line
10. Importance of One-point perspective side view sketches

Unit II

11. 3 Quarter Front view on Flat Horizontal line
12. Using Vanishing Points
13. Orientation of Ellipses in 3 Quarter Perspective
14. Shading of Object w.r.t Angle of Incidence of Light
15. Shading value and contrast in the Object
16. Shadow and background Importance in sketches

Unit III

2. 3 Quarter Back View

Unit IV

3. Tip Top view
4. Drawing objects in varying 3d Perspective Angles.

SKILL ENHANCEMENT COURSE 4
APD114: CMF – COLOUR, MATERIAL & FINISH
LTP 212

Pre-Requisites: N.A.

Course Objective:

- In this module the students are taught various colours, leather and fiber materials in vehicle interiors and finishing of those.

Contents:

Unit I

- Metallic colours, matte and glossy
- Types of leather and its tanning process
- Plastic and wooden alternatives of leather used in vehicle interior

Unit II

- Finish in stitching, surfaces and components
- Product visualization in different lighting
- Brand identity & its development

Unit III

- Marker or software renders of different materials with varying surfaces
- Final Presentation

References

1. Dezeen.com
2. <https://colormarketing.org/2018/05/18/cmf-design-what-is-it/>
3. Online tutorials from YouTube
4. Carbodydesign.com

SEMESTER VI
APD303: DIGITAL SURFACING II
LTP 104

Pre-Requisites: APD301

Course Objective:

Surfacing and its application in Modeling.

Course Contents:

Unit I

1. Constructing the Side Surface
2. Constructing the Top Surface
3. Applying a Transition Between the Front and Top Surfaces
4. Applying a Transition Between the Rear and Top Surfaces
5. Transition Surfaces
6. Constructing Simple Transitions
7. Constructing a Transition Surface at the Rear of the Model

Unit II

8. Constructing Ball Corners
9. Finishing the Model
10. Advanced Surface Modeling
11. Handling Blend Curves
12. Crucial Blend Curve Tools
13. Information Provided by Blend Curves
14. Blend Curves as Transition Curves
15. Blend Curve Constraint to a Surface Edge
16. Blend Curve Constraint to an ISO parameter
17. Blend Curve Constraint to a Curve-On-Surface
18. Blend Curve Constraint to a Curve

Unit III

19. Understanding the Align Tool
20. Handling the Align Tool
21. Basics of surface fillets

22. Selection Process & Undo All
23. Addressing Interior Breaks in Continuity
24. When to use Bezier Surfaces instead of NURBS Geometry
25. When to use NURBS Geometry instead of Bezier Geometry
26. Choosing the Right Curve for the Job
27. Surface Continuity

Unit IV

28. Model Check
29. Dynamic Section
30. Clipping Plane
31. Minimum Radii
32. CV Distribution
33. Span Distribution
34. Surface Evaluation

Reference

1. Learning studio tools from Autodesk Website help
2. Autodesk technical Surfacing , 2008
3. Learning Design with Alias R StudioToolsTM
4. A Hands-on Guide to Modeling and Visualization in 3D, Fridolin T. Beisert
5. Learning Autodesk Alias Design 2012 by Prof. Sham Tickoo Purdue Univ. and CAD/CIM Technologies
6. Online tutorials from youtube
7. Carbodydesign.com

APD304: 3D MODEL RENDERING

LTP 104

Pre-Requisites: APD206, APD303

Course Objective:

(Keyshot or V-RED)

A basic complete car with exterior and interior is to be modeled in this final Module (or a product). Key shot is also introduced, which is used to render the 3d model by assigning materials to the 3d model from Alias Studio tools in different environments and backgrounds.

Course Contents:

Unit I

- Data Import
- Scene workflow
- Render settings

Unit II

- Materials
- Texture Mapping and Labeling
- HDRIs and Lighting
- Camera Settings

Unit III

- Post Processing
- Scripting
- Keyshot (or V-RED) configurator

List of Exercises:

1. Layer Segregation and Importing of 3D Model in Keyshot (or V-RED) Workspace
2. Assigning of Materials of car body
3. Assigning of Materials to a Product.
4. Placing Rendered Object in Different Environments.

Reference

1. Learning studio tools from Autodesk Website help
2. Autodesk technical Surfacing , 2008

3. Learning Design with Alias R StudioToolsTM
4. A Hands-on Guide to Modeling and Visualization in 3D, Fridolin T. Beisert
5. Learning Autodesk Alias Design 2012 by Prof. Sham Tickoo Purdue Univ. and CAD/CIM Technologies
6. Online tutorials from youtube
7. Carbodydesign.com

DISCIPLINE SPECIFIC ELECTIVE 4

LTP 114

Pre-Requisites: N.A.

Course Objective:

This is a Discipline specific Elective. The student is free to choose his field of interest from **Car, Bike, Product or Interior Sketching**. Only one subject of interest is taught in the each elective. There are a total of 4 DSE and the student is free to build on the expertise level of the first subject by taking 2nd part of same field or choose a different field of interest in the remaining three DSE.

It is a further continuation of Advanced sketching of products/ Automobiles in various perspectives and angles. It is the fundamental study for the final Design projects in the coming semesters.

ELECTIVES LIST.

Pre-Requisites	Course Code	Course Name
N.A	APD 121	Car design sketching I
N.A	APD 122	Bike design sketching I
N.A	APD 125	Interior Sketching I
N.A	APD 124	Product design detailing I
APD 121	APD 221	Car Design Sketching II
APD 122	APD 225	Bike design sketching II
APD 123	APD 226	Interior Sketching II
APD 124	APD 224	Product design detailing II

Contents:

Unit I

11. Basic side view with Epsilon line
12. Advanced side view with details in front and back of object in Plan view.
13. Shading of the Object
14. Importance of character line
15. Importance of One point perspective side view sketches

Unit II

13. 3 Quarter Front view on Flat Horizontal line
14. Using Vanishing Points
15. Orientation of Ellipses in 3 Quarter Perspective
16. Shading of Object w.r.t Angle of Incidence of Light
17. Shading value and contrast in the Object
18. Shadow and background Importance in sketches

Unit III

3. 3 Quarter Back View

Unit IV

5. Tip Top view
6. Drawing objects in varying 3d Perspective Angles.

GENERAL ELECTIVE 2

LTP 114

Course Objective:

In this module the students are given a pool of subjects to choose from, which are selected by the educational course committee.

The students learn to explore design solutions to various problems and fields, and solve them through design. The students are encouraged to think for the future. They are taught to critically think and cultivate a habit of free spirit and positive thinking. This is a design exercise which prepares them for the upcoming reality situations in their life.

Pre-Requisites	Course Code	Course Name	Contact Hours			Credits
			L	T	P	
N.A	APD124	Inter disciplinary project	1	1	4	4
N.A	APD125	Shoe design	1	1	4	4
N.A	APD126	Toy design	1	1	4	4
N.A	APD127	Social project	1	1	4	4
N.A	APD128	Storytelling and design	1	1	4	4
N.A	APD129	Everyday function	1	1	4	4
N.A	APD130	Sci Fi Project yr 2050	1	1	4	4
N.A	APD131	Smart Watch Design	1	1	4	4
N.A	APD132	Yacht design	1	1	4	4
N.A	APD133	Mass Transport	1	1	4	4
Contents: N.A	APD134	3 wheeler design	1	1	4	4

Unit I

- Research of customer profile
- Research about current Market competitors
- Inspiration and Mood Board

Unit II

- Ideation sketches
- Product Screening
- Final Sketch development

Unit III

- Marker or software renders
- Final Presentation

INDUSTRIAL VISIT

Pre-Requisites: N.A.

Course Objective:

This course aims at giving a hand on exposure to the way in which things are manufactured in a given industrial set up. The role of the student would be to observe and learn the production methods, and witness how mass production is handled.

The destination will be fixed up by the management and it will be mandatory for each student to go there on self - finance basis.

The schedule is approximately 5 to 7 days, inclusive of the travel days by train.

APD307: DESIGN PROJECT III

LTP 214

Pre-Requisites: APD109, APD201

Course Objective:

The students will be given a medium difficulty level open design project where he/she will be expected to design a new vehicle/product for the specific given theme. The project will utilize the skills acquired in the other subjects taught during the course.

The outcome of this project will be expected in the form of free hand sketches and marker/digital renders.

The timeline and professional level of completion of the said project will enable the students to work as per the industry standards followed globally.

Design project

- Project Declaration, mood board & story board creation, concept generation, ideation and concept development, sketching around the concept, Ideation and development, Renderings
- Final presentation

Reference Books:

1. Design Research: Methods and Perspectives by Brenda Laurel and Peter Lunenfeld.
2. Research Design: Qualitative, Quantitative and Mixed Methods Approaches by CRESWELL.
3. 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization by Vijay Kumar.

SEMESTER 7
SKILL ENHANCEMENT COURSE 3
APD113: AERODYNAMICS AND SAFETY REGULATIONS
LTP 220

Pre-Requisites: N.A.

Course Objective:

Aerodynamics started life as much as an art as a science. Early experiments used fish as the inspiration. Their sleek form was considered important to facilitate fast movement. The course tries to relate aerodynamic form and respective function through the experimental approach it takes. The students learn about the basic principles of aerodynamics and flight, including how the forces of lift, drag, and thrust interact.

Contents:

Unit I

- History of aerodynamics, related designs and the future
- Da Vinci works on flight dynamics, Wright brothers, rocket inspired designs in cars, current trends in form
- Aerodynamic forces – technical/mathematical side
- Lift, drag, down force, side force, coefficient of drag, fluid dynamics, wind tunnel testing, Slipstream

Unit II

- Aerodynamics and nature's design
- Streamlined bodies, Shark skin and related inspirations in design, Humpback whales flippers
- Aerodynamics in heavy vehicles
- Trucks, Bullet trains
- Aerodynamic considerations in vehicles

Unit III

- Shapes – conceiving teardrop shape, various aerodynamic devices used in cars, technology for efficient aerodynamics
- Extreme aerodynamics applications
- Performance cars – F1, Aircraft Aerodynamics, Rockets and space carriers, submarines
- Form explorations based on aerodynamics

- Static and dynamic forms, Speed forms, efficiency of movable forms/parts
- Design Modifications related to safety.

Presentation and Assignments:

- Give a Presentation on any one of the following.
- Aerodynamics in Formula one car
- Aerodynamics in a plane
- New Technologies in Safety of a pedestrian car
- Contribution of Aerodynamics in improving efficiency of a Car.

DISCIPLINE SPECIFIC ELECTIVE 4

LTP 114

Course Objective:

This is a Discipline specific Elective. The student is free to choose his field of interest from Car, Bike, Product or **Interior Sketching**. Only one subject of interest is taught in the each elective. There are a total of 4 DSE and the student is free to build on the expertise level of the first subject by taking 2nd part of same field or choose a different field of interest in the remaining three DSE.

It is a further continuation of Advanced sketching of products/ Automobiles in various perspectives and angles. It is the fundamental study for the final Design projects in the coming semesters.

ELECTIVE LIST.

Pre-Requisites	Course Code	Course Name
N.A	APD 121	Car design sketching I
N.A	APD 122	Bike design sketching I
N.A	APD 125	Interior Sketching I
N.A	APD 124	Product design detailing I
APD 121	APD 221	Car design sketching II
APD 122	APD 225	Bike design sketching II
APD 123	APD 226	Interior Sketching II
APD 124	APD 224	Product design detailing II

Contents:

Unit I

1. Basic side view with Epsilon line
2. Advanced side view with details in front and back of object in Plan view.
3. Shading of the Object
4. Importance of character line
5. Importance of One point perspective side view sketches

Unit II

19. 3 Quarter Front view on Flat Horizontal line
20. Using Vanishing Points
21. Orientation of Ellipses in 3 Quarter Perspective
22. Shading of Object w.r.t Angle of Incidence of Light
23. Shading value and contrast in the Object
24. Shadow and background Importance in sketches

Unit III

4. 3 Quarter Back View

Unit IV

7. Tip Top view
8. Drawing objects in varying 3d Perspective Angles.

•

GENERAL ELECTIVE 3**LTP 114****Course Objective:**

In this module the students are given a pool of subjects to choose from, which are selected by the educational course committee.

The students learn to explore design solutions to various problems and fields, and solve them through design. The students are encouraged to think for the future. They are taught to critically think and cultivate a habit of free spirit and positive thinking. This is a design exercise which prepares them for the upcoming reality situations in their life.

Pre-Requisites	Course Code	Course Name	Contact Hours			Credits
			L	T	P	
N.A	APD124	Inter disciplinary project	1	1	4	4
N.A	APD125	Shoe design	1	1	4	4
N.A	APD126	Toy design	1	1	4	4
N.A	APD127	Social project	1	1	4	4
N.A	APD128	Storytelling and design	1	1	4	4
N.A	APD129	Everyday function	1	1	4	4
N.A	APD130	Sci Fi Project yr 2050	1	1	4	4
N.A	APD131	Smart Watch Design	1	1	4	4
N.A	APD132	Yacht design	1	1	4	4
N.A	APD133	Mass Transport	1	1	4	4
N.A	APD134	3 wheeler design	1	1	4	4

Contents:**Unit I**

- Research of customer profile
- Research about current Market competitors
- Inspiration and Mood Board

Unit II

- Ideation sketches
- Product Screening
- Final Sketch development

Unit III

- Marker or software renders
- Final Presentation

APD309: DESIGN PROJECT IV**LTP 214**

Pre-Requisites: APD109, APD201.

Course Objective:

The students will be given a medium difficulty level open design project where he/she will be expected to design a new vehicle/product for the specific given theme. The project will utilize the skills acquired in the other subjects taught during the course.

The outcome of this project will be expected in the form of free hand sketches and marker/digital renders.

The timeline and professional level of completion of the said project will enable the students to work as per the industry standards followed globally.

Design project

- Project Declaration, mood board & story board creation, concept generation, ideation and concept development, sketching around the concept, Ideation and development, Renderings
- Final presentation

Reference Books:

1. Design Research: Methods and Perspectives by Brenda Laurel and Peter Lunenfeld.
2. Research Design: Qualitative, Quantitative and Mixed Methods Approaches by CRESWELL.
3. 101 Design Methods: A Structured Approach for Driving Innovation in Your Organization by Vijay Kumar.

Pre-Requisites: N.A.

Course Objective:

The student should give a seminar on a design study assigned to him by his tutor. The student will be given freedom to search for a suitable and meaningful topic and prepare content for his seminar. His seminar will be valued in terms of the importance to solving problems in current scenario and problems faced by life on the planet or the planet itself.

Course Objective:

- During this final Semester, Students will be working on the Final Project which would exhibit their understanding and learning throughout the previous seven semesters.
- The Final Project topic will be decided during the course of time. This project will be of higher complexity and the most important part of the whole course since it will give the final touch to the design learning of the student. Students shall be working individually to give shape to the designing of the product under the given topic.
- Progress on project shall be evaluated periodically through presentation at various stages, by the jury. The deliverables of the project shall be project report, sketches, final and mock-up models, design drawings, photographs and the final presentation including techno-commercial viability of the proposed new/improved designs.
- It is expected that the students take this project as industry sponsored project. This period of a semester is also treated as internship as student can actually report to the organization which they choose to do the internship with.
- All systems and procedures as applicable to the internship shall be followed. Student will have the external guide (at the place of internship) and also an internal mentor.
- Those students not able to find or not willing to work with a sponsor, is free to complete the project on the campus under the guidance of an internal guide.