RAMAIAH UNIVERSITY OF APPLIED SCIENCES

M S Ramaiah University of Applied Sciences

Programme Structure and Course Details of

M.Des. (Product Design) 2022-2023

Programme Code: 041

Faculty of Art and Design

Department of Product Design

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M.S.Ramaiah University of Applied Sciences
Bangalore - 560 054

Dean - Academics
M.S. Ramaiah University of Applied Sciences
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University's Vision, Mission and Objectives

The M. S. Ramaiah University of Applied Sciences (MSRUAS) will focus on student-centric professional education and motivates its staff and students to contribute significantly to the growth of technology, science, economy and society through their imaginative, creative and innovative pursuits. Hence, the University has articulated the following vision and objectives.

Vision

MSRUAS aspires to be the premier university of choice in Asia for student centric professional education and services with a strong focus on applied research whilst maintaining the highest academic and ethical standards in a creative and innovative environment

Mission

Our purpose is the creation and dissemination of knowledge. We are committed to creativity, innovation and excellence in our teaching and research. We value integrity, quality and teamwork in all our endeavors. We inspire critical thinking, personal development and a passion for lifelong learning. We serve the technical, scientific and economic needs of our Society.

Objectives

1. To disseminate knowledge and skills through instructions, teaching, training, seminars, workshops and symposia in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to equip students and scholars to meet the needs of industries, business and society
2. To generate knowledge through research in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences to meet the challenges that arise in industry, business and society
3. To promote health, human well-being and provide holistic healthcare
4. To provide technical and scientific solutions to real life problems posed by industry, business and society in Engineering and Technology, Art and Design, Management and Commerce, Health and Allied Sciences, Physical and Life Sciences, Arts, Humanities and Social Sciences
5. To instill the spirit of entrepreneurship in our youth to help create more career opportunities in the society by incubating and nurturing technology product ideas and supporting technology backed business
6. To identify and nurture leadership skills in students and help in the development of our future leaders to enrich the society we live in
7. To develop partnership with universities, industries, businesses, research establishments, NGOs, international organizations, governmental organizations in India and abroad to enrich the experiences of faculties and students through research and developmental programme

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Programme Specifications: M. Des. (Product Design)

Faculty	Art and Design (FAD)
Department	Industrial Design
Programme Code	041
Programme Name	M.Des. (Product Design)
Dean of the Faculty	Mr. H. S. Lohit
Head of the Department	Mr. H. S. Lohit

1. **Title of the Award:** M.Des. in Product Design
2. **Mode of Study:** Full-Time
3. **Awarding Institution /Body:** M. S. Ramaiah University of Applied Sciences, Bengaluru
4. **Joint Award:** Not Applicable
5. **Teaching Institution:** Faculty of Art and Design, M. S. Ramaiah University of Applied Sciences, Bengaluru
6. **Date of Programme Specifications:** July 2022
7. **Date of Programme Approval by the Academic Council of MSRUAS:** 14-July-2022
8. **Next Review Date:** July 2025/26
9. **Programme Approving Regulating Body and Date of Approval:** --
10. **Programme Accredited Body and Date of Accreditation:** Not Applicable
11. **Grade Awarded by the Accreditation Body:** Not Applicable
12. **Programme Accreditation Validity:** Not Applicable
13. **Programme Benchmark:** Not Applicable
14. **Rationale for the Programme**

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India is stated to be the largest consumer market in the world by the year 2030, according to a report by the global professional services company Deloitte in the year 2013. As the Indian economy continues to grow stronger, it offers vast opportunities for multinational firms to make further inroads into India as well as national firms to expand globally. With the increase in household income in the urban populace in India which is further stated to grow by around 10 percent annually for the next 8 years, according to a report by McKinsey Global Institute, a global management consulting firm in the year 2011, the Indian consumer is spending more on utility and luxury consumer products to match their needs and lifestyle.

The Indian consumer durables sector is competitive with both International and National players vying to woo consumers by offering newer, better and more value for money products. Some of the key players in the consumer durables sector in the Indian market include Philips, General Motors, Hyundai, Samsung, LG, Onida, Mahindra & Mahindra, Micromax, Tata Technologies, HCL Technologies, Godrej, Bajaj, TVS Motor Company, to name a few. To increase the value addition in their product offerings the firms have started focusing heavily on verticals such as product design.

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As per data furnished by National Institute of Design to corporations such as Autodesk and others, it is estimated that India needs a workforce of 5000 to 8000 skilled designers per annum whilst the number of designers graduating from educational institutes in India are less than 500. Furthermore, due to high demand, entry level designers are being offered higher salaries when compared to entry level tech graduates, according to The Economic Times Bureau, 2014. With better career prospects, design is being viewed as a better alternative for students to pursue.

With an intention to create highly skilled, industry ready and sought-after product designers, the Faculty of Art and Design at the University has developed a superior design programme in the field of Product Design. This programme provides the prospective students with a strong design foundation coupled with art education so that the students can create not only aesthetically pleasing but also functionally appealing products. The graduates thus produced will be able to meet the human resources requirement of the product design sector. The graduates will be able to ideate and create newer and better product design solutions. Moreover, this acts as a first programme to develop further expertise in a chosen domain of product design.

As design is highly interdisciplinary in nature, the University provides an ideal platform for students to interact and work with others from different disciplines such as engineering, medicine and management. Furthermore, the Faculty of Art and Design at the University is presently associated with PACE (Partners for the Advancement of Collaborative Engineering Education) which links firms such as General Motors, Siemens, Hewlett-Packard with selected academic institutions worldwide to nurture young talent and create the product development teams of the future.

15. Programme Mission

The purpose of the programme is creation of innovative problem solvers in multi-disciplinary settings, entrepreneurs and leaders applying the knowledge, understanding, cognitive abilities, practical skills and transferable skills gained through systematic, flexible and rigorous learning in the chosen academic domain.

16. Gradate Attributes (GAs)

GA-1. Design knowledge: Apply knowledge of design thinking, observational skills, design interpretation and design fundamentals to solve design problems

GA-2. Problem analysis: Identify, formulate, review research literature, and analyze complex design problems reaching substantiated conclusions using principles of design and natural sciences.

GA-3. Design/development of solutions: Design solutions for design problems that meet the specified needs with appropriate consideration for functionality, usability and safety, and cultural, societal, and environmental considerations.

GA-4. Conduct investigations of complex problems: Use research-based knowledge and research methods including design of idea generating techniques, ethnographic research, TRIZ method and interpretation of data, and synthesis of the information to provide valid design conclusions.

GA-5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern design tools using latest digital modelling rendering and animation software. To enhance and derive at techniques such as trend prediction etc. to solve future problems.

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GA-6. The designer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional design practice.

GA-7. Environment and sustainability: Understand the impact of the professional design solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

GA-8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the design practice.

GA-9. Individual and teamwork: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

GA-10. Communication: Communicate effectively on complex design activities with the design community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

GA-11. Project management and finance: Demonstrate knowledge and understanding of the design and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

GA-12. Life-long learning: Recognize the need for and have the preparation and ability to engage in independent and life-long learning in the broadest context of design evolution.

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17. Programme Outcomes (POs)

M.Des. graduates will be able to:

PO 1. Apply knowledge of art and Design fundamentals to solve complex problems in product development

PO 2. Identify design problems, interpret data and arrive at meaningful conclusions involving design inferences

PO 3. Design an artefact considering functionality, usability and safety, and the cultural, societal, and environmental considerations

PO 4. Ability to comprehend and solve complex design problems by interacting with the end users

PO 5. Apply appropriate tools and techniques and comprehend utilization of resources appropriately to complex design activities

PO 6. Ability to comprehend the effect of design solutions on legal, cultural, social and functional and safety aspects

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PO 7. Ability to develop sustainable solutions and comprehend their effect on society and environment

PO 8. Apply ethical principles to design practices and professional responsibilities

PO 9. Ability to work as a member of a team, to plan and to integrate knowledge of various design and engineering disciplines and to lead teams in multidisciplinary settings

PO 10. Ability to communicate effectively on complex design activities with the design community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11. Ability to demonstrate knowledge and understanding of the design and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO 12. Ability to adapt to the changes and advancements in technology and engage in independent and life-long learning

18. Programme Goal

The programme goal is to produce creative, innovative and skilled graduates with an ability to think independently and pursue a career in Product Design.

19. Program Educational Objectives (PEOs)

The objectives of the M.Des. (Product Design) Programme are to:

PEO-1. Inculcate in-depth research and design thinking methodology to generate design ideas for new and innovative products

PEO-2. Induce effective usage of innovative and creative thinking techniques to develop unique products for the Design Industry and relevant societal requirements considering current design trends

PEO-3. Impart advanced design skills, manual and digital tools, advanced surface modeling techniques and complex manufacturing and assembly techniques to develop and communicate design ideas effectively

PEO-4. Advocate strong human values, social, interpersonal, leadership and entrepreneurial skills required for professional success in evolving global professional environments

20. Programme Specific Outcomes (PSOs)

At the end of the M.Des. (Product Design) program, the graduate will be able to:

PSO-1. Apply design methodologies and research to solve complex design problems and create innovative design solutions

PSO-2. Demonstrate advanced design skills, digital model making and physical prototyping skills to convey design ideas

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PSO-3. Adapt to technological advancements in modern design tools to communicate design ideas considering aesthetic, material and functional parameters for a wide spectrum of product design applications to solve design problems

PSO-4. Demonstrate an understanding of the importance of life-long learning through professional development, practical training, leadership qualities, specialized certifications and entrepreneurial skills for betterment of organization environment and society

21. Programme Structure:

Semester 1

Sl. No	Course Code	Course Designation	Name of the Course	hours (h/W/S)			Credits	Max. Marks
				Theory	Tutorial	Practical		
1	19PRD501B	M1	Elements of Design	2	0	4	4	100
2	19PRD502B	M2	Concept Sketching and Presentation	2	0	4	4	100
3	19PRD503B	M3	Digital Sculpting and Rendering	2	0	4	4	100
4	19PRD504B	M4	Virtual and Physical Product Modelling	2	0	4	4	100
5	19HST501B	CM1	Research Methodology	2	0	0	2	50
6	19SEM501B	SEM1	Skill Enhancement Course	0	0	4	2	50
Total				10	0	20	**20**	**500**
Total Number of Contact Hours per Week				**30**	**Hours**			
Number of Credits can be registered				Minimum	**20**	Maximum		**20**

Semester-2

Sl. No	Course Code	Course Designation	Name of the Course	hours (h/W/S)			Credits	Max. Marks
				Theory	Tutorial	Practical		
1	19PRD505B	M5	Design Methodology and Research	2	0	4	4	100
2	19PRD506B	M6	Creativity and Systematic Innovation	2	0	4	4	100
3	19PRD507B	M7	Ergonomics in Product Design	2	0	4	4	100
4	19PRD5XXB	EX1	*Refer Elective Course Table*	2	0	4	4	100
5	19PRD5XXB	EX2	*Refer Elective Course Table*	2	0	4	4	100
Total				10	0	20	**20**	**500**
Total Number of Contact Hours per Week				**30**	Hours			
Number of Credits can be registered				Minimum	**20**	Maximum		**20**

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Semester-3								
Sl. No.	Course Code	Course Designation	Name of the Course	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	19PRD595B	INT	Internship/ Mini Project	-	-	8	4	100
2	19PRD599B	GP	Group project	-	-	20	10	200
3	19PRD5XXB	EX3	*Refer Elective Course Table*	0	0	8	4	100
4	19SEM502B	SEM2	Skill Enhancement Course	0	0	4	2	50
Total						**40**	**20**	**450**
Total number of contact hours per week				**40 hours**				
Number of credits can be registered				Minimum	**20**	Maximum		**20**

Semester-4								
Sl. No.	Course Code	Course Designation	Name of the Course	Theory (h/W/S)	Tutorials (h/W/S)	Practical (h/W/S)	Total Credits	Max. Marks
1	19PRD600B	DP	Dissertation and Publication	-	-	40	20	400
Total						**40**	**20**	**400**
Total number of contact hours per week				**40 hours**				
Number of credits can be registered				Minimum	**20**	Maximum		**20**

Elective Courses List			
Stream / Specialization	S. No.	Course Code	Course Title
Stream -1 (Advanced Product Design and Development)	E11	19PRD511B	Mechanisms and Modeling for Design
	E12	19PRD521B	Design for Manufacturing and Assembly
	E13	19PRD531B	Portfolio Design and Presentation
Stream-2 (Interactive Product Design)	E21	19PRD512B	Interactive Design and Technology
	E22	19PRD522B	User Experience Design
	E23	19PRD531B	Portfolio Design and Presentation

22. Skill Enhancement Course:

Students will be awarded 2 credits on completion of either one of the following, in a given semester:

- Participation in Art and Design exhibitions and shows
- Participation in National & international design competition
- Field/ Industrial visit
- MOOC Course

23. Course Delivery: As per the Timetable

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24. Teaching and Learning Methods

1. Face to Face Lectures using Audio-Visuals
2. Workshops, Group Discussions, Debates, Presentations
3. Demonstrations
4. Guest Lectures
5. Laboratory work/Field work/Workshop
6. Industry Visit
7. Seminars
8. Group Exercises
9. Project Work
10. Project
11. Exhibitions
12. Technical Festivals

25. Assessment and Grading

25.1. Components of Grading

There shall be **two components** of grading in the assessment of each course:

Component 1, Continuous Evaluation (CE): This component involves multiple subcomponents (SC1, SC2, etc.) of learning assessment. The assessment of the subcomponents of CE is conducted during the semester at regular intervals. This subcomponent represents the formative assessment of students' learning.

Component 2, Semester-end Examination (SEE): This component represents the summative assessment carried out in the form an examination conducted at the end of the semester.

Marks obtained CE and SEE components have equal weightage (CE: 50% and SEE: 50%) in determining the final marks obtained by a student in a Course.

The complete details of Grading are given in the Academic Regulations.

25.2. Continuous Evaluation Policies

Continuous evaluation depends on the type of the course as discussed below:

25.2.1 Theory Courses

Theory Course			
SC1	SC2	SC3	SC4
25 Marks	25 Marks	25 Marks	25 Marks

There shall be four subcomponents of CE (SC1, SC2, SC3 and SC4). Each subcomponent is evaluated individually for 25 marks. It is mandatory that two of the four subcomponents are term-tests. The remaining two subcomponents can be of any of the following types:

a) Online Test

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b) Assignments/Problem Solving
c) Field Assignment
d) Open Book Test
e) Portfolio
f) Reports
g) Case Study
h) Group Task
i) Any other

After the four subcomponents are evaluated, the CE component marks are determined as:
CE Component Marks = (Total of the marks obtained in all the four subcomponents) ÷ 2

An additional subcomponent (SC5) may be used at the discretion of the Faculty/Department. The department can conduct the 5th subcomponent SC5 if this subcomponent gives benefit to students. If the Department/Faculty conducts the SC5 subcomponent of evaluation, and the score obtained by the student in SC5 is greater than the lowest score of the previous four subcomponents SC1 to SC4, then it replaces the lowest of the four scores.

25.2.2 Laboratory Course

For a laboratory course, the scheme for determining the CE marks is as under:

Laboratory Course		
SC1	SC2	SC3 (Optional)
25 Marks	25 Marks	25 Marks

The subcomponents can be of any of the following types:

a) Laboratory / Clinical Work Record
b) Experiments
c) Computer Simulations
d) Creative Submission
e) Virtual Labs
f) Viva / Oral Exam
g) Lab Manual Report
h) Any other (e.g. combinations)

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After the subcomponents of CE are evaluated, the CE component Marks are determined as:

CE Component Marks = (Total of the best two subcomponent marks out of the three) ÷ 2

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25.2.3 Course Having a Combination of Theory and Laboratory

For a course that contains the combination of theory and laboratory sessions, the scheme for determining the CE marks is as under:

For a Course having a Combination of Theory and Laboratory Sessions		
SC1 (Midterm)	SC2 (Creative work Submission/ Assignment)	SC3 (Creative workSubmission/ Assignment)
50 Marks	25 Marks	25 Marks

There shall be three subcomponents. Out of these, there shallbe one Midterm, two creative work Submission/ assignment to evaluate the students' performance.

The theory assignment can be of any of the following types:

a) Online Test
b) Problem Solving
c) Field Assignment
d) Open Book Test
e) Portfolio
f) Reports
g) Case Study
h) Group Task
i) Any other

The laboratory subcomponent can be of any of the following types:

a) Laboratory / Clinical Work Record
b) Experiments
c) Computer Simulations
d) Creative Submission
e) Virtual Labs
f) Viva / Oral Exam
g) Lab Manual Report
h) Any other (e.g. combinations)

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After the four subcomponents are evaluated, the CE component marks are determined as:
CE Component Marks = (Total of the marks obtained in all the four subcomponents) ÷ 2

26. Student Support for Learning

1. Course Notes
2. Reference Books in the Library
3. Magazines and Journals
4. Internet Facility

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5. Computing Facility
6. Laboratory Facility
7. Workshop Facility
8. Staff Support
9. Lounges for Discussions
10. Any other support that enhances their learning

27. Quality Control Measures

1. Review of Course Notes
2. Review of Question Papers and Assignment Questions
3. Student Feedback
4. Moderation of Assessed Work
5. Opportunities for students to see their assessed work
6. Review by external examiners and external examiners reports
7. Staff Student Consultative Committee meetings
8. Student exit feedback
9. Subject Assessment Board (SAB)
10. Programme Assessment Board (PAB)

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28. Programme Map (Course-PO-PSO Map)

Sem.	Course Title	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
1	Elements of Design	3	3	2	3	2		1	1	2	2		3	3	3	2	
1	Concept Sketching and Presentation	3	3	2	2	1			1	1	2		1	2	3		
1	Digital Sculpting and Rendering	1	3	1	2	1								2	3		
1	Virtual and Physical Product Modelling	2	3	3	1	1									3		
1	Research Methodology		2								3		1	2			
1	Skill Enhancement Course	2	2	3	2	1	1	1	2	1	1	1	2	1	3	1	1
2	Design Methodology and Research			3													
2	Creativity and Systematic Innovation		3		1		1				1						
2	Ergonomics in Product Design	1		2	1										1		
2	Mechanisms and Modeling for Design		2	3											2		
2	Design for Manufacturing and Assembly	3	2	3	2	2	3	3	2	2	2		1		3		
2	Portfolio Design and Presentation	3	2	1	1				1		3	2	1	2	3		
3	Internship/ Mini Project	3	3	2	2	2	2	1	2	3	3	1	2	2	3	2	1
3	Group project	2	3	3	2	2	1	1	2	3	3	2	1	3	3	1	1
3	Interactive Design and Technology	1	2	3	1	1								1	2	3	
3	User Experience Design	1	3	1	1						2			2	3		
3	Portfolio Design and Presentation	3	2	1	1				1		3	2	1	2	3	1	
3	Skill Enhancement Course	2	2	3	2	1	1	1	2	1	1	1	2	1	3	1	1
4	Dissertation and Publication										3						

3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution

29. Co-curricular Activities

Students are encouraged to take part in co-curricular activities like seminars, conferences, symposia, paper writing, attending industry exhibitions, project competitions and related activities for enhancing their knowledge and networking.

30. Cultural and Literary Activities

Annual cultural festivals are held to showcase the creative talents in students. They are involved in planning and organizing the activities.

31. Sports and Athletics

Students are encouraged to take part in sports and athletic events regularly. Annual sports meet will be held to demonstrate sportsmanship and competitive spirit.

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Course Specifications: Mechanisms and Modelling for Design

Course Title	Mechanisms and Modelling for Design
Course Code	19PRD511B
Course Type	Core Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

This Course deals with elements of design and manipulation of design elements to create newer forms. Students are taught concepts of form generation, form transition, visual composition, exploded view, radii transformation, topology, orientable and non-orientable surfaces in 2D and 3D for visualization. Students will be trained on sketching and physical model making of basic forms

2. Course Size and Credits:

Number of Credits	4
Credit Structure (Lecture: Tutorial: Practical)	2:0:2
Total Hours of Interaction	60
Number of Weeks in a Semester	15
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

- **CO-1.** Classify mechanisms and identify their applications
- **CO-2.** Relate the motion of the component in a mechanism
- **CO-3.** Create models of mechanisms and animate to study motion for functionality
- **CO-4.** Propose mechanisms for products to achieve desired functionality
- **CO-5.** Model product concepts incorporating mechanisms
- **CO-6.** Create product models and digitally animate mechanisms

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4. Course Contents

Unit 1 (Applications of mechanisms in product design): Introduction to Consumer products, Consumer durables, transportation Design, and Construction equipment
Unit 2 (Mechanisms and their applications): Levers, Wedges, Linkages, CAMS.
Unit 3 (Power transmission Gear Drive): Gears, Drives and their application
Unit 4 (Geometric Modelling): CAD techniques for generating three-dimensional, wire frame, surface, and solid models, Preparation of design documents according to current ISO and ANSI standards
Unit 4 (Computer simulation of mechanisms): Preparation of computer models of mechanisms simulating operations
Unit 5 (Hydraulic and pneumatics): Significance and applications of hydraulics and pneumatics

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in machinery, Hydraulic power transmission systems: Basic hydraulic transmission system, Hydrostatic Pumps and Motors, Hydraulic actuators, Valves

Unit 6 (Proposing new Mechanisms to meet the product functionality) Concepts of kinematics, synthesis and analysis of mechanisms during design of different types of machinery

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1																
CO-2																
CO-3	1		2										1	1		
CO-4	1		3			2			2				1	2		
CO-5		1	1			2			2					2		
CO-6									1					2		

3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		30
Demonstrations		05
1. Demonstration using Videos	01	
2. Demonstration using Physical Models / Systems	04	
3. Demonstration on a Computer	00	
Tutorial		00
1. Tutorial	00	
Practical Work		15
1. Course Laboratory	15	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		00
1. Case Study Presentation	00	
2. Guest Lecture	00	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	00	
5. Group Discussions	00	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		**60**

7. Course Assessment and Reassessment

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The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the B.Tech. (Electronics and Communication Engineering) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation				
	Component 1: CE (50% Weightage)			Component 2: SEE (50% Weightage)
Subcomponent ▶	SC1	SC2	SC3	
Subcomponent Type ▶	Midterm	CWS	CWS	100 Marks
Maximum Marks ▶	50	25	25	
CO-1	x	x	x	x
CO-2	x	x	x	x
CO-3	x	x	x	x
CO-4		x	x	x
CO-5		x	x	x
CO-6		x	x	x
The details of SC1, SC2, SC3 or SC4 are presented in the Programme Specifications Document.				

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures
2.	Understanding	Class Room Lectures
3.	Critical Skills	Creative Work Submission
4.	Analytical Skills	Classroom Lectures, Creative Work Submission and Examination
5.	Problem Solving Skills	Examination and Creative Work Submission
6.	Practical Skills	Class Room Lectures, Laboratory and Field
7.	Group Work	Work
8.	Self-Learning	Class Room Interaction
9.	Written Communication Skills	Creative Work Submission and Examination
10.	Verbal Communication Skills	Creative Work Submission and Examination
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Presentation

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13.	Information Management	Interaction with peers and tutors
14.	Personal Management	Creative Work Submission, Presentation and Examination
15.	Leadership Skills	Interaction with peers and tutors

9. Course Resources

a. Essential Reading

1. Course notes
2. Wilson, C. E. and Sadler, J. P. (2003) Kinematics and Dynamics of Machinery, 3rd edn, Prentice Hall
3. Myszka D. H. (2004) Machines and Mechanisms. 3rd edition., Pearson Education

b. Recommended Reading

1. Lesko, J. (2008) Industrial Design: Materials and Manufacturing Guide, 2nd edn, John Wiley & Sons
2. R.L.Norton. (2004) Design of Machinery, 3rd edition, McGraw-Hill.
3. J.J.Uicker, G.R.Pennock, and J.E.Shigley. (2003) Theory of Mechanisms and Machines, Oxford University Press.
4. Charles E. Wilson and J. Peter Sadler. (2003) Kinematics and Dynamics of Machinery, 3rd edition, Prentice Hall.

c. Magazines and Journals

1. THE ARTIST Journal of Mechanisms J Mech, Elsevier Science
2. Mechanism and Machine Theory, Elsevier
3. JSME International Journal - Series C: Mechanical Systems Machine Elements and Manufacturing. Quarterly, JSME

d. Websites

1. www.flying-pig.co.uk/mechanisms

10. Course Organization

Course Code	19PRD511B	
Course Title	Mechanisms and Modelling for Design	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	**Phone:**	+91-804-906-5555
	E-mail:	hod.id.ad@msruas.ac.in hod.fd.ad@msruas.ac.in
Course Specifications Approval Date	23-Oct-2020	
Next Course Specifications Review Date	May-2024	

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Course Specifications: Elements of Design

Course Title	Elements of Design
Course Code	19PRD501B
Course Type	Core Theory Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

This Course deals with elements of design and manipulation of design elements to create newer forms. Students are taught concepts of form generation, form transition, visual composition, exploded view, radii transformation, topology, orientable and non-orientable surfaces in 2D and 3D for visualization. Students will be trained on sketching and physical model making of basic forms.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	1:0:3
Total Hours of Interaction	90
Number of Weeks in a Semester	16
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO 1. Discuss the application of basic design elements for visual literacy
CO 2. Apply principles for 2D form generation
CO 3. Adopt and explore form generation techniques for 3D objects
CO 4. Demonstrate sketching and physical model making abilities
CO 5. Evaluate classic and historical products and their significance
CO 6. Prepare 2D and 3D display material for design presentations

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4. Course Contents

Unit 1 (Elements of design and visual literacy): Elements of design, Metaphors and visual literacy through Line, Shape, Form, Tone, Texture, Unity, Variety, Rhythm, Harmony, Balance, Proportion and Golden section

Unit 2 (Foreground and background): Figure and Ground, Figure and ground factors, Design principles for figure and ground, Balance, Symmetry

Unit 3 (3D abstraction): Study of 3D abstraction in art and sculpture, Exploration of industrial material and Processes as elements of design through 3D abstraction of entities in nature

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Unit 4 (Product expressions): Study of product expressions by analyzing in terms of elements like form, proportion, color, texture Expressions in Form like soft, hard, warm, cold, precise, gross, delicate, strong, fragile, rugged.

Unit 5 (Sketching): Sketching of 2D composition and 3D objects using various mediums like pencils, Dry pastels, Charcoal, Markers, Water colours, Cartridge sheets, Colour sheets, Tracing papers

Unit 6 (Metaphors and Forms): Nature and form, color and form, Use of metaphors and family concept to generate new forms

Unit 7 (History of Design): Industrial revolution, Design reforms, Design movements such as Art and craft movement, Aesthetic movement, Art novueau, Deutsche werkbund, De still, Bauhaus, Ulm, Art deco, Streamlining, Emergence of American design profession.

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1		2								2						
CO-2	3		3										3			
CO-3	3		3										3	3		
CO-4	3		3		2								2			
CO-5		3	2													
CO-6	3		3	2	3								3	3	3	
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in Hours	Total Duration in Hours
Face to Face Lectures		10
Demonstrations		10
1. Demonstration using Videos	5	
2. Demonstration using Physical Models/Systems	15	
3. Demonstration on a Computer		
Tutorial		
1. Tutorial		
Practical Work		55
1. Course Laboratory		
2. Computer Laboratory		
3. Engineering Workshop/Course Workshop/Kitchen	55	
4. Clinical Laboratory		
5. Hospital		
6. Model Studio		
Others		
1. Case Study Presentation	3	
2. Guest Lecture	5	

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3. Industry/Field Visit		
4. Brain Storming Sessions		
5. Group Discussions	5	
6. Discussing Possible Innovations		
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		100

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Des (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation				
	Component 1: CE (50% Weightage)			Component 2: SEE (50% Weightage)
Subcomponent ▶	SC1	SC2	SC3	
Subcomponent Type ▶	Midterm	CWS	CWS	100 Marks
Maximum Marks ▶	50	25	25	
CO-1	x			x
CO-2	x	x	x	x
CO-3	x	x	x	x
CO-4	x	x	x	x
CO-5	x			x
CO-6		x	x	x
The details of SC1, SC2, SC3 or SC4 are presented in the Programme Specifications Document.				

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

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S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures and laboratory instructions
2.	Understanding	Class room lectures and laboratory instructions
3.	Critical Skills	Creative work Submission
4.	Analytical Skills	Class Room Lectures, Laboratory and Creative work Submission
5.	Problem Solving Skills	Creative work Submission and Examination
6.	Practical Skills	Creative work Submission and Practical
7.	Group Work	Creative work Submission and Practical
8.	Self-Learning	Creative work Submission and Practical
9.	Written Communication Skills	Creative work Submission and Examination
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interaction with peers, instructors
13.	Information Management	Creative work Submission, Presentation and Examination
14.	Personal Management	Interaction and requirements of discipline
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

a. Essential Reading

1. Course notes
2. Raizman, D. (2003) History of Modern Design. London: Laurence King Publishing

b. Recommended Reading

1. Itten, J. (2004) The Art of Color. Stuttgart: Wiley
2. Dondis, D. A. (2003) Primer of Visual Literacy. MIT Press
3. Hannah, G. G. (2002) Elements of Design: Rowena Reed Kostellow & The structure of visual relationship. Princeton Architectural Press
4. Fiell, C. and Fiell, P. (1999) Design of 20th Century.Taschen
5. Glancey, J. Modern: (1999) Masters of the 20th Century Interior. Rizzoli Publication

c. Magazines and Journals

1. ID
2. Axis
3. Form
4. Graphics
5. Form
6. Journal of Experimental
7. Journal of Experimental Psychology: Human Perception and Performance, APA Journals
8. Journal of Design History, Oxford University Press

d. Websites

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e. **Other Electronic Resources**
Personal Computer

10. **Course Organization**

Course Code	19PRD501B		
Course Title	Elements of Design		
Course Leader's Name		As per Timetable	
Course Leader's Contact Details		**Phone:**	+91-804-906-5555
		E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date		23-Oct-2020	
Next Course Specifications Review Date		May-2024	

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Course Specifications: Concept Sketching and Presentation

Course Title	Concept Sketching and Presentation
Course Code	19PRD502B
Course Type	Core Theory Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

This Course enables the students to generate product concepts and visualize them through manual and digital media. Students will be taught various design principles like product perception, product expression and product semantics, use of metaphors in creating the concept design and visualization. Rendering skills will be imparted through analog and digital media.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	2:0:2
Total Hours of Interaction	90
Number of Weeks in a Semester	15
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

- **CO-1.** Draw three-dimensional product forms in perspective
- **CO-2.** Identify appropriate colour, media and finishes to render product forms
- **CO-3.** Generate design concepts inspired from visual theme boards and metaphors
- **CO-4.** Sketch and illustrate design ideas through manual media
- **CO-5.** Demonstrate the application manual and digital tool to visualize design concepts
- **CO-6.** Apply design principles to effectively present and communicate design ideas

4. Course Contents

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Unit 1 (Design Principles): Application of Design Principles in Sketching: Design Communication and Gestalt Principles, Theory of object perception, Symmetry, Asymmetry, Closure, Continuance, Pragnanz, Visual balance, Colour and unity

Unit 2 (Sketching): Choosing viewpoints (Birds eye, Eye level, Side view), Roundings (Single and Multiple), Tubes, Intuitive sketching

Unit 3 (Concept Sketching): Doodle sketching, ideation/ explorative sketches, free hand drawing and product concepts, Importance of perspective views, single point, two point and 3point perspective views, Thumbnail sketches. Instructional Drawing, Explanatory Drawings,

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Product presentation sketch

Unit 4 (Design Expression): Design styling, Image board, Lifestyle board, Mood board, theme board Design trends, Product aesthetics, Presentation Techniques. Study of product expressions by analyzing in terms of elements like form, proportion, color, texture

Unit 5 (Sketching Media): Product forms using mediums like pencils, Dry pastels, Charcoal, Markers, Copier sheets, Marker papers, Colour sheets, Tracing papers

Unit 6 (Expression Color and Material): Tonal contrast, Suggesting Depth, Glossy and Matt, Transparency, Metal, Surface and Textures, Product Graphics, practice session

Unit 7 (Product Semantics): Understanding meaning and personal identity in products, Product expressions based on the product theme, Generation of new product forms from nature

Unit 8 (Metaphors): Role of Metaphors and analogies used in idea generation and concept design, Case studies on concepts derived from metaphors

Unit 9 (Manual and Digital Rendering): Manual Rendering Medias: pencil, pen, marker, dry pastels, and Digital render using raster-based software

Unit 10 (Product Context): Adding product details, Background images, Tracing human shapes (hands and People), Focal point, Arrows, Explanatory drawings, Cut-away, Ghosting, Instructional drawings

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3		2	1										2		
CO-2			2	2												
CO-3		3				1							2			
CO-4	2		3											1		
CO-5			3											3		
CO-6	1			2						3					2	
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		30
Demonstrations		20
1. Demonstration using Videos	06	
2. Demonstration using Physical Models / Systems	08	
3. Demonstration on a Computer	06	
Tutorial		00
1. Tutorial	00	

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Practical Work		35
1. Course Laboratory	25	
2. Computer Laboratory	10	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		05
1. Case Study Presentation	03	
2. Guest Lecture	02	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	00	
5. Group Discussions	00	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		**100**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Des. (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation				
	Component 1: CE (50% Weightage)			**Component 2: SEE (50% Weightage)**
Subcomponent ▶	**SC1**	**SC2**	**SC3**	
Subcomponent Type ▶	**Midterm**	**CWS**	**CWS**	**100 Marks**
Maximum Marks ▶	**50**	**25**	**25**	
CO-1		x		x
CO-2	x	x	x	x
CO-3			x	x
CO-4		x		x
CO-5	x		x	x
CO-6	x	x	x	x
The details of SC1, SC2, SC3 or SC4 are presented in the Programme Specifications Document.				

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

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Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

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The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room lectures and laboratory
2.	Understanding	instructions
3.	Critical Skills	Class room lectures, laboratory instructions
4.	Analytical Skills	and demonstrations
5.	Problem Solving Skills	Creative Work Submission
6.	Practical Skills	Class room, laboratory, Creative Work Submission
7.	Group Work	Laboratory, Creative Work Submission
8.	Self-Learning	Laboratory, Creative Work Submission
9.	Written Communication Skills	Creative Work Submission, laboratory
10.	Verbal Communication Skills	Creative Work Submission
11.	Presentation Skills	Creative Work Submission, Examination
12.	Behavioral Skills	Presentation
13.	Information Management	Presentation
14.	Personal Management	Course
15.	Leadership Skills	Interaction with peers and tutors

9. Course Resources

a. Essential Reading

1. Class Notes
2. Eissen, Koos ; Steur, Roselien, Sketching- Drawing Techniqes for Product Design, BIS Publishers
3. Powell, D. (1996) Design Rendering Techniques: A Guide to Drawing and Presenting Design Ideas, Publisher: North Light Books

b. Recommended Reading

1. Edwards B. (2002) New Drawing on the Right Side of the Brain Workbook: Guided
2. Practice in the Five Basic Skills of Drawing, Tarcher
3. Hannah G. G. (2002) Elements of Design: Rowena Reed Kostellow and the Structure of Visual Relationship, Princeton Architectural Press
4. Edwards B. (1999) The New Drawing on the Right Side of the Brain: A Programme in Enhancing Creativity and Artistic Confidence, Tarcher
5. Artin J. (2001) The Encyclopedia of Pastel Techniques: A Unique A-Z Directory of Pastel- Painting Techniques Plus Guidance on How Best to Use Them, Search Press
6. Eissen, Koos ; Steur, Roselien, (2014) Sketching Product Design Presentation, BIS Publishers
7. Eissen, Koos ; Steur, Roselien, (2011) Sketching: The Basics, BIS Publishers
8. Eissen, Koos ; Steur, Roselien, (2007) Sketching: Drawing Techniques for Product Designers, BIS Publishers
9. Pipes A. (2007) Drawing for Designers, Laurence King Publishers

c. Magazines and Journals

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1. ID
2. Axis
3. Form
4. Graphics
5. Form
6. Sketch Magazine
7. Innovation Journal, Industrial Design Society of America
8. British Gestalt Journal, British Gestalt Journal Publisher
9. Journal of Experimental Psychology: Human Perception and Performance, APA Journals

d. Websites

1. http://www.sketches.com
2. http://www.conceptsketches.tumblr.com
3. http://www.idsketching.com/

e. Other Electronic Resources

1. Personal Computer
2. Drawing/ Sketching tools and media

10. Course Organization

Course Code	19PRD502B	
Course Title	Concept Sketching and Presentation	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	**Phone:**	+91-804-906-5555
	E-mail:	hod.id.ad@msruas.ac.in hod.fd.ad@msruas.ac.in
Course Specifications Approval Date	23-Oct-2020	
Next Course Specifications Review Date	May-2024	

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Course Specifications: Digital Sculpting and Rendering

Course Title	Digital Sculpting and Rendering
Course Code	19PRD503B
Course Type	Core Theory
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

This course is intended to prepare students to convert concept sketches into digital 3D surface models for enhanced concept visualization. Students are taught to generate geometric curves and surfaces based on 2D sketches/ blue prints of concepts. Students are also trained to refine the developed models and achieve A- class surfaces as per industrial standards. They are trained to communicate design concepts through concept rendering and animation.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	2:0:2
Total Hours of Interaction	60
Number of Weeks in a Semester	15
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

- **CO-1.** Discuss the effectiveness of surface modeling for concept visualization and presentation
- **CO-2.** Create 3D curves digitally using curve editing tools and analyze the curve quality with the help of locators
- **CO-3.** Describe the quality of surfaces
- **CO-4.** Construct surfaces using curves and analyze the surface quality
- **CO-5.** Build 3D models by using surface alignment and transformation tools
- **CO-6.** Prepare and present renderings and animation of 3 D models

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4. Course Contents

Unit 1 (Introduction to surface modeling): Surface modeling software used in industrial product design, basics of curve and surface based modeling, Alias Studio Design Principles, interface layout, n navigating using the View Cube, Working with Layout Windows, Diagnostic Shading, Working with Layers, introduction to CAD translators for industry standard data formats such as DXF, IGES, and STEP files, glance of reverse engineering (RE).

Unit 2 (Interface of modelling software): Working in 2D and 3D, Using Canvas Planes, Mouse Constraints, setting for pivot points, working with canvas, scaling, and moving objects.

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mirroring object, duplicating object, grouping objects, working with CV's, Construction Options Introduction, Dimensions.

Unit 3 (Curves): Curves Introduction, Create Edit Point Curves, Create Symmetrical Curves, Key point Curves and Locators, Cubic Spline, bezier curves, Bspline Curve, Nurbs Curve, Curve Manipulation, Evaluating points on curves, Creating Curve Fillets, Creating Curve Sections, Blending, Segmentation, Trimming, Intersection, Transformations and Curvature Analysis

Unit 4 (Surfaces): Surfaces Introduction, Difference between Surfaces and Solids, Using Query Edit, Planar Surfaces, Constructive Surface Geometry (CSG) modelling, Representation of Surfaces, Bi-cubic Surface, B-Spline Surface, Bezier surface, Nurbs Surface and surface analysis. Various surface creating methods (Extrude surface, Rail surface , Skin surface, surface of revolution, Planner surface, Bevel surface, Square surface, Tube surface, Multi surface, Flange surface)
Surface manipulation, Segmentation, trimming, Intersection, transformations of 2D and 3D surfaces like move, rotate and scaling. Absolute and relative methods of transforming. Creating Different forms.

Unit 5 (Class A): Class A surface modelling: Importance of Class A surface modelling, Geometric and Parametric Continuity, Positional Continuity, Tangent Continuity, Curvature Continuity and Surface Evaluation.

Unit 6 (Rendering and Presentation): Presenting Your Designs: Rendering in Alias Studio Introduction, Hardware Shade Light Settings, Hardware Shade Environment Effects, Environments, Creating Image Files, Bookmarks. Animation process: To model, animate, fine tune, and to finally render animated scene.

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5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2				1								2			
CO-2		2														
CO-3					1											
CO-4		2			2								2			
CO-5		3												2		
CO-6										2	1			2	3	
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		20
Demonstrations		10
1. Demonstration using Videos	05	
2. Demonstration using Physical Models / Systems	05	
3. Demonstration on a Computer	00	

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Tutorial		00
1. Tutorial	00	
Practical Work		55
1. Course Laboratory	00	
2. Computer Laboratory	55	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		05
1. Case Study Presentation	05	
2. Guest Lecture	00	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	00	
5. Group Discussions	00	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		**100**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the (M.Des. Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation				
	Component 1: CE (50% Weightage)			**Component 2: SEE (50% Weightage)**
Subcomponent ▶	**SC1**	**SC2**	**SC3**	
Subcomponent Type ▶	**Midterm**	**CWS**	**CWS**	**100 Marks**
Maximum Marks ▶	**50**	**25**	**25**	
CO-1	X			X
CO-2				X
CO-3	X		X	X
CO-4		X	X	X
CO-5		X	X	X
CO-6		X	X	X
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class Room Lectures
2.	Understanding	Class Room Lectures
3.	Critical Skills	Creative Work
4.	Analytical Skills	Class Room Lectures, Creative Work and Examination
5.	Problem Solving Skills	Examination and Creative Work
6.	Practical Skills	Practical and Creative Work
7.	Group Work	Practical and Creative Work
8.	Self-Learning	Practical and Creative Work
9.	Written Communication Skills	Creative Work and Examination
10.	Verbal Communication Skills	Creative Work and Examination
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interaction with peers and tutors
13.	Information Management	Creative Work, Examination and Presentation
14.	Personal Management	Interaction and Discipline
15.	Leadership Skills	Time management and achieving the learning outcomes

9. Course Resources

a. Essential Reading

1. Course notes
2. Sham Tickoo, (2014) Learning Autodesk Alias Design 2015 Paperback, CADCIM Technologies

b. Recommended Reading

1. (2006) Learning Design with Alias Studio Tools: A Hands-On Guide to Modeling and Visualization in 3D (Official Alias Training Guide), SYBEX Inc., Alameda, CA, USA
2. Modeling Essentials with Studio Tools – Industrial Design Techniques with Henry

c. Magazines and Journals

1. ID Magazine
2. Intelligent Transport
3. Car Design News
4. Carbody Design
5. Azure
6. Dezeen

d. Websites

1. au.autodesk.com/india

e. Other Electronic Resources

1. Personal computer
2. Autodesk ALIAS Software

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10. Course Organization

Course Code	19PRD503B

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Course Title	Digital Sculpting and Rendering		
Course Leader's Name		As per Timetable	
Course Leader's Contact Details		**Phone:**	+91-804-906-5555
		E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date		23-Oct-2020	
Next Course Specifications Review Date		May-2024	

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Course Specifications: Research Methodology

Course Title	Research Methodology
Course Code	19HST501B
Course Type	Core Theory Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

This Course deals with the principles of research, research methodology and significant phases of research. Students are taught the significant role of Literature Review in a research cycle and the expectations from good literature review as well as procedure for systematic literature review. The essential aspects of technical communication to develop desirable writing skills for the preparation of research document including research paper as well as the skills for an effective presentation are also discussed. The Course also emphasizes the desirable close knit relation between innovation and concept of out of the box thinking. Students will get an insight into the privilege, honour and the associated responsibilities of a researcher.

2. Course Size and Credits:

Number of Credits	02
Credit Structure (Lecture:Tutorial:Practical)	2:0:0
Total Hours of Interaction	40
Number of Weeks in a Semester	15
Department Responsible	Fashion Design
Total Course Marks	50
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

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After the successful completion of this course, the student will be able to:

- **CO-1.** Describe the value, scope, relevance and mandatory steps of research as well as principles of effective research
- **CO-2.** Discuss the application and utility of the Systematic approach and out of box thinking concepts for research to be effective
- **CO-3.** Discuss the procedures outlined for a systematic Literature Review
- **CO-4.** Analyse and prepare well-structured research proposal and research paper invoking clearly outlined principles
- **CO-5.** Identify and apply the essential skills desirable for an effective technical presentation

4. Course Contents

Unit 1 (Foundations of Research): Definitions of Research, Mandatory Steps in Research, Types of Research, Relevance of Research for Innovation and Technology Development.

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Effective Research and Self Discipline

Unit 2 (Out of the Box Thinking and Systematic approach in Research): Transformation to Impossible Thinking, Convergent and Divergent Thinking, Generation, Evaluation and Selection of Ideas

Unit 3 (Literature Review): Importance of Literature Review, Constituents of Good Literature Review, Strategies for Literature Search, Referencing, Paraphrasing, and Summarizing Academic Standards and Ethics

Unit 4 (Statistical Methods and Data Analysis): Types of data, Data Representation, Sampling Design, Data Collection Methods, Overview of Data Analysis Techniques.

Unit 5 (Technical Communication): Research Paper for Publication- Significance of Problem Statement and its scope, Formulation of Hypothesis, Adequacy of Methodology, Significance of Presentation and Discussion of Results, Relevance and Importance of references.

Unit 6 (Effective Presentation): Preparation, Templates, Balance between Good Design and Good Content, Planning and Sequencing, PAMPERS (Projection, Articulation, Modulation, Punctuation, Enunciation, Repetition and Speed) rule, PEOPLE (Position & Gestures, Eye Contact, Orientation, Proximation, Looks & Appearance, and Expressions & Emotion) rule, 4P's Rule (Plan, Prepare, Practice and Present), Essentials of Effectiveness, Effective Pausing and Inclusive Answering

Unit 7 (Research Proposal): Structure of a Good Research Proposal, Getting Started, Tips for Compilation of Good Research Proposal.

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1				1									1			
CO-2		2										1	1			
CO-3				1									1			
CO-4										3						
CO-5										3						
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		26
Demonstrations		00
1.Demonstration using Videos	00	
2. Demonstration using Physical Models / Systems	00	
3. Demonstration on a Computer	00	
Numeracy		00
1. Solving Numerical Problems	00	
Practical Work		00
1. Course Laboratory	00	
2. Computer Laboratory	00	

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3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		
1. Case Study Presentation	04	04
2. Guest Lecture	00	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	00	
5. Group Discussions	00	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		**40**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M. Des. (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component(CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of Cos on each Component or Subcomponent of Evaluation			
	Component 1: CE (50% Weightage)		Component 2: SEE (50% Weightage)
Subcomponent ▶	SC1	SC2	
Subcomponent Type ▶	Midterm	Assignment	50 Marks
Maximum Marks ▶	25	25	
CO-1	X		X
CO-2	X		X
CO-3	X		X
CO-4		X	
CO-5		X	X
The details of SC1 and SC2 are presented in the Programme Specifications Document.			

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures
2.	Understanding	Classroom lectures, Self-study

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3.	Critical Skills	Assignment
4.	Analytical Skills	Assignment
5.	Problem Solving Skills	Assignment, Examination
6.	Practical Skills	Assignment
7.	Group Work	--
8.	Self-Learning	Self-study
9.	Written Communication Skills	Assignment, Examination
10.	Verbal Communication Skills	--
11.	Presentation Skills	--
12.	Behavioral Skills	--
13.	Information Management	Assignment
14.	Personal Management	--
15.	Leadership Skills	--

9. Course Resources

a. Essential Reading

1. Course notes
2. Booth, Colomb and Williams. (2005) The Craft of Research, Chicago University Press

b. Recommended Reading

1. Willium and Trochim (2003) Research Methods, 2nd Edition, Biztantra Publications
2. Grix (2004) The Foundation of Research, Palgrave Study Guides
3. Gina (2001) The Post Graduate Research Handbook, Palgrave Study Guides
4. Rugg and Petre (2004) The Unwritten Rules of Ph.D. research, Open University Press

c. Magazines and Journals

1. International Journal of Social Research Methodology, United Kingdom
2. Research Methodology in Strategy and Management, Netherlands
3. Health Services and Outcomes Research Methodology, Netherlands
4. BMC Medical Research Methodology, United Kingdom

d. Websites

1. www.pnas.org
2. www.ccrm.in

e. Other Electronic Resources

1. E-Book on Six Thinking Hats by Edward de Bono
2. E-Book on Thinking Fast and Slow by Daniel Kahneman

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10. Course Organization

Course Code	19HST501B	
Course Title	Research Methodology	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	**Phone:**	+9108049065555
	E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date	23-Oct-2020	
Next Course Specifications Review Date	May-2022	

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Course Specifications: Design Methodology and Research

Course Title	Design Methodology and Research
Course Code	19PRD505B
Course Type	Core Theory Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

This Course prepares the students to understand the context and frame the design problem in an insightful way. Students will be taught design research methods, research strategies and tactics, factors of influence on consumer behavior and research data analysis to understand needs of the consumer and product requirements. Students will be trained to understand, differentiate and prioritize between conflicting requirements and arrive at design brief/ product design specifications

2. Course Size and Credits:

Number of Credits	4
Credit Structure (Lecture: Tutorial: Practical)	1:0:3
Total Hours of Interaction	100
Number of Weeks in a Semester	16
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO 1. Identify appropriate design methods and techniques to be used to gain insights into needs/ wants of the consumer
CO 2. Reconstruct a design problem in an insightful way
CO 3. Analyze data for insights into behavior and needs of the consumer
CO 4. Translate consumer voices to technical voices and develop the House of Quality (QFD)
CO 5. Develop Product Design Specification based on the data analyzed
Propose product design ideas based on design specification

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4. Course Contents

Unit 1 (Design Methodology): Different stages of product design cycle, Life cycle of a product, Business perspective of product design, Product Planning, Design Methods, Deconstructing design - Divergence, Transformation, Convergence, New Product Design Strategies, and Ideal product design

Unit 2 (Consumer Behavior and Influences): Consumer Attitudes and Situational influences, Consumer decision Process and problem recognition, Post-purchase processes, Customer satisfaction and commitment

Unit 3(Design Problem) : From Function to Form, Defining Problems, Setting goals and objectives, Understanding requirements vs. wishes

Unit 4 (Design Study): Product Study, Market Study, User Study, Need Identification and

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Exploration

Unit 5(Methods of Research): Qualitative and Quantitative Research, Primary and Secondary Research, Formative and Summative Research

Unit 6 (Research Strategies and Tactics): Literature Survey, Observatory Research, Research Problem Formulation, and Research plan, Competitor Analysis, Contextual Inquiry, Questionnaires, Interviews and Focus Group.

Unit 7 (Research Data Analysis): Understanding Basic need, Performance need, Exciting need, Customer voice to technical voice conversion, Product Benching Marking, Customer perception on quality, Quality Function Deployment, Context and Constraints, Product Design Brief, Product Design Specification

Unit 8 (Concept Design): Conceptualizing ideas based on product design specification, Fish Bowl Principle, suggesting product improvements

Unit 9 (Evaluation and Decision Making): : Design Decisions, Product Design Evaluation Methods - Decision-matrix method, weighted ranking method, C.A.F.E.Q.U.E. value - Cost, Aesthetics, Function, Ergonomics, Quality, User, Environment, and Evaluation Techniques

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1		3														
CO-2		1	3										1	3		
CO-3	2	3	2	1									1			
CO-4				1						3			1	3		
CO-5														3		
CO-6						3		2		2				2		
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		10
Demonstrations		20
1. Demonstration using Videos	05	
2. Demonstration using Physical Models / Systems	15	
3. Demonstration on a Computer	00	
Tutorial		00
1. Tutorial	00	
Practical Work		45
1. Course Laboratory	45	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	

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5. Hospital	00	
6. Model Studio	00	
Others		15
1. Case Study Presentation	03	
2. Guest Lecture	05	
3. Industry / Field Visit	02	
4. Brain Storming Sessions	00	
5. Group Discussions	05	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		**100**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Des. (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation				
	Component 1: CE (50% Weightage)			**Component 2: SEE (50% Weightage)**
Subcomponent ▶	**SC1**	**SC2**	**SC3**	
Subcomponent Type ▶	**Midterm**	**CWS**	**CWS**	**100 Marks**
Maximum Marks ▶	**50**	**25**	**25**	
CO-1	X			X
CO-2	X			X
CO-3		X	X	X
CO-4		X	X	X
CO-5		X	X	X
CO-6		X	X	X
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures
2.	Understanding	Class Room Lectures
3.	Critical Skills	Creative Work Submission
4.	Analytical Skills	Classroom Lectures, Creative Work Submission and Examination

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5.	Problem Solving Skills	Examination and Creative Work Submission
6.	Practical Skills	Class Room Lectures, Laboratory and Field
7.	Group Work	Work
8.	Self-Learning	Class Room Interaction
9.	Written Communication Skills	Creative Work Submission and Examination
10.	Verbal Communication Skills	Creative Work Submission and Examination
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Presentation
13.	Information Management	Interaction with peers and tutors
14.	Personal Management	Creative Work Submission, Presentation and Examination
15.	Leadership Skills	Interaction with peers and tutors

9. Course Resources

a. Essential Reading

1. Class Notes
2. Ulrich, K.T. and Eppinger, S. D. (2003) Product Design and Development. 4th edition. McGraw-Hill

b. Recommended Reading

1. Creswell J.W. (2008) Research Design: Qualitative, Quantitative, and Mixed Methods
2. Approaches. 3rd edition, Sage Publications
3. Bordens K. and Abbott B. B. (2007) Research Design and Methods: A Process Approach.
4. 7th edition, McGraw Hill
5. Madison D.S. (2005) Critical Ethnography: Method, Ethics, and Performance. 1st edition,
6. Sage Publications
7. Laurel B. (2003) Design Research: Methods and Perspectives, The MIT Press
8. Schensul J. J, LeCompte M. D. and Schensul S. (1999) Designing & Conducting
9. Ethnographic Research (Ethnographer's Toolkit), AltaMira Press
10. Otto, K. and Wood, K. (2001) Product design: Techniques in Reverse Engineering and
11. New Product development. Prentice Hall
12. Cross, N. (2000) Engineering Design Methods: Strategies for Product Design. Willey

c.Magazines and Journals

1. ID Magazine
2. Consumer Reports Magazine
3. Journal of Design Research, Inderscience Publishers
4. Design Studies, Elsevier Publication
5. Ethnography, Sage Journals
6. Journal of Contemporary Ethnography, Sage Journals

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d. Websites

1. http://www.ulrich-eppinger.net/ (accessed on 8th March 2013)
2. http://www.npd-solutions.com (accessed on 8th March 2013)
3. http://www.qfdi.org (accessed on 8th March 2013)

e. Other Electronic Resources

1. Personal computer
2. Video camera
3. Digital camera

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10. **Course Organization**

Course Code	19PRD505B		
Course Title	Design Methodology and Research		
Course Leader's Name		As per Timetable	
Course Leader's Contact Details		**Phone:**	+91-804-906-5555
		E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date		23-Oct-2020	
Next Course Specifications Review Date		May-2024	

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Course Specifications: Virtual and Physical Product Modeling

Course Title	Virtual and Physical Product Modelling
Course Code	19PRD504B
Course Type	Core Theory Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

This Course deals with virtual modelling which involves solid modelling and surface modelling techniques. It also deals with subsequent process of physical model creation which includes clay modelling and Rapid prototyping. Students will also deal with relevant materials and manufacturing processes and they will also be exposed to case studies involving virtual and physical models.

2. Course Size and Credits:

Number of Credits	05
Credit Structure (Lecture:Tutorial:Practical)	2:0:3
Total Hours of Interaction	90
Number of Weeks in a Semester	15
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

- **CO-1.** Describe virtual modelling techniques and its applications
- **CO-2.** Describe physical modelling techniques and its applications
- **CO-3.** Choose materials and processes for physical models to achieve the design intent
- **CO-4.** Propose appropriate materials and processes for product development
- **CO-5.** Apply reverse engineering and rapid prototyping techniques to design a product

4. Course Contents

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Virtual modelling: The concepts of CAD/CAM in product development cycle: models using wire frame, surface or solid modelling techniques, assembly techniques.

Principles of reverse engineering and rapid prototyping techniques for product development: Reverse Engineering: Reverse engineering processes and applications, techniques and methodologies, accuracy and errors Computer-aided prototyping:

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Rapid prototyping systems, tooling, technology, processes and applications.

Physical modelling: Clay modeling: Taping surrounding surfaces, masking ,wet and dry clay peeling, rendering, foam, POP, sunboard, wood, MDF, FRP, Paper, Card- board, Painting.

Form, Function and Fit - Form, function and fit, Form vs. function, Relationship between form and function, Geometric and organic forms, Expression as a basis of new form, Attractiveness and product style, Four faces of attractiveness

Introduction to material and their properties: Material classification, Types of materials available to designers, Mechanical properties, Physical properties, Chemical properties.

Manufacturing Processes - Casting, Forging, Hot rolling, Sheet metal forming and Drawing, Machining, Joining, Finishing, vacuum forming.

Polymers – Properties and applications - Thermoplastics – Acetal, Acrylic, ABS, PTFE, Polyamides, Polyester, Polyethylene, Polypropylene, Polystyrene, PVC. Thermos, Injection moulding, Gas assisted injection moulding, Blow moulding, Thermoformining.

Selection of materials - Design process, Types of designs, Design tools and Material data, Design criteria for material selection, Effect of shape factors, Effect of manufacturing process, Material selection charts

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1			3	2	1									3		
CO-2			3	2	1									3		
CO-3					1		2							3	2	
CO-4					1		2							3	2	
CO-5					1		2							3	2	

3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		20
Demonstrations		10
1.Demonstration usingVideos	05	
2. Demonstration using PhysicalModels / Systems	05	
3. Demonstration on a Computer	00	
Tutorial		00
1. Tutorial	00	
Practical Work		50
1. Course Laboratory	30	

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2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		
1. Case Study Presentation	00	10
2. Guest Lecture	00	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	00	
5. Group Discussions	00	
6. Discussing Possible Innovations	00	
Term Tests,Laboratory Examination/Written Examination,Presentations		10
Total Duration in Hours		**100**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M. Design (M Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component(CE or SEE) or subcomponent of CE (SC1, SC2, SC3), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation				
	Component 1: CE (50% Weightage)			**Component 2: SEE (50% Weightage)**
Subcomponent ▶	**SC1**	**SC2**	**SC3**	
Subcomponent Type ▶	**Midterm**	**CWS**	**CWS**	**100 Marks**
Maximum Marks ▶	**50**	**25**	**25**	
CO-1	X			X
CO-2	X			X
CO-3	X	X	X	X
CO-4		X	X	X
CO-5		X	X	X
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

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S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures
2.	Understanding	Class Room Lectures
3.	Critical Skills	Creative Work Submission
4.	Analytical Skills	Classroom Lectures, Creative Work Submission and Examination
5.	Problem Solving Skills	Examination and Creative Work Submission
6.	Practical Skills	Class Room Lectures, Laboratory and Field
7.	Group Work	Work
8.	Self-Learning	Class Room Interaction
9.	Written Communication Skills	Creative Work Submission and Examination
10.	Verbal Communication Skills	Creative Work Submission and Examination
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Presentation
13.	Information Management	Interaction with peers and tutors
14.	Personal Management	Creative Work Submission, Presentation and Examination
15.	Leadership Skills	Interaction with peers and tutors

9. CourseResources

a. EssentialReading

1. Course notes
2. Budinski. (2009) Engineering Materials - Properties and Selection. 9th edition, Prentice Hall.

b. Recommended Reading

1. Coats D. (2002) Watches Tell More than Time: Product Design, Information, Quest for elegance.
2. 2. Otto K. and Wood K. (2001) Product design: Techniques in Reverse Engineering and New Product development, Prentice Hall.
3. 3. Dekker. (2001) Rapid Prototyping – Selection and Application, Marcel Inc5. Glancey, J. Modern: (1999) Masters of the 20th Century Interior. Rizzoli Publication
4.

c. Magazines and Journals

1. ID
2. Form
3. Graphics
4. Journal of Design History, Oxford University Press

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d. Websites

e. Other Electronic Resources

Personal Computer, Drawing tools, Model making materials (PU foam, POP, Thermocol Card Board etc.) and tools

10. Course Organization

Course Code	19PRD504B
Course Title	Virtual and Physical Product Modelling
Course Leader's Name	As per Timetable

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Course Leader's Contact Details	Phone:	+91-804-906-5555
	E-mail:	hod.id.ad@msruas.ac.in hod.fd.ad@msruas.ac.in
Course Specifications Approval Date	23-Oct-2020	
Next Course Specifications Review Date	May-2022	

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Course Specifications: Creativity and Systematic Innovation

Course Title	Creativity and Systematic Innovation
Course Code	19PRD506A
Course Type	Core Theory Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

This Course prepares the students to apply creative and systematic innovation approaches for problem solving. Students will be trained to apply tools such as lateral thinking, six thinking hats, brainstorming, mind mapping, TRIZ, morphological analysis and SCAMPER for solving design problems. Students will be trained to understand the underlying theory of nature inspired innovation, social innovation and IPR issues related to Industrial Design.

2. Course Size and Credits:

Number of Credits	4
Credit Structure (Lecture: Tutorial: Practical)	1:0:3
Total Hours of Interaction	100
Number of Weeks in a Semester	16
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

- **CO 1.** Identify appropriate creativity and systematic innovation approaches to solve design problems
- **CO 2.** Apply knowledge of Intellectual Property Rights related to Product Design and Innovation
- **CO 3.** Analyze trends in product design to predict design futures
- **CO 4.** Discuss ideas for a design problem to achieve ideal final result
- **CO 5.** Propose design solutions using creativity and systematic innovation tools and techniques

4. Course Contents

Unit 1 (Creative Thinking): Creative Thinking, Barriers to Creativity (Personal and Organizational), and Determinants of creativity, Model of creative Intelligence, Creative Environment, and Managerial Practices

Unit 2 (Creativity): Creative Problem Solving, Classification of creative techniques, Creative methods (Thinking outside the box, Five Ws, Brainstorming, Synectics, Analogies and Chance, Lateral Thinking vs. Vertical Thinking, Six Thinking Hats, Problem Reversing, Mind Mapping, Story Boarding, Morphological Analysis and SCAMPER)

Unit 3(Envisioning the future): Using imagination, Thinking Empathetically, Trends in Product Design, Product trend analysis board

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Unit 4 (Innovation): Innovation as a Core competency, Breakthrough Innovation, Innovation vs. Invention, Types of Innovations such as Process innovation, Product innovation and Market innovation, Consequence of Innovation

Unit 5(Systematic Innovation): Attribute listing, Functional Analysis, Morphological analysis, TRIZ philosophy, Levels of Invention, Context and Constraints, Ideality and the ideal final result (IFR), Contradictions/40 Principles

Unit 6 (Nature inspired innovation): Nature as a Model, Principles of Bio mimicry, Nature's laws and Strategies, Harnessing Power of Nature

Unit 7 (Social Innovation): Role of culture and social environment on innovation, changing and Challenging Mindsets and Behaviors, Diffusion of Innovation, Innovation based on Human Emotions, Frugal Innovation

Unit 8 (Intellectual Property Rights): Objectives of IPR, Novelty and Patentability of Innovations, Understanding copyrights, trademarks, patents, industrial design rights and trade secrets

Unit 9 (Proposing design solutions): Sketches/ Drawings/ Models and Posters, Focus group/research results, Market overview, Cost estimates

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1			2													
CO-2	3												1			
CO-3																
CO-4			3	2									2			
CO-5		1	2	3	2								3			
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		10
Demonstrations		20
1. Demonstration using Videos	05	
2. Demonstration using Physical Models / Systems	15	
3. Demonstration on a Computer	00	
Tutorial		00
1. Tutorial	00	
Practical Work		45
1. Course Laboratory	45	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	

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5. Hospital	00	
6. Model Studio	00	
Others		
1. Case Study Presentation	03	15
2. Guest Lecture	05	
3. Industry / Field Visit	02	
4. Brain Storming Sessions	00	
5. Group Discussions	05	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		**100**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Des. (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation				
	Component 1: CE (50% Weightage)			**Component 2: SEE (50% Weightage)**
Subcomponent ▶	**SC1**	**SC2**	**SC3**	
Subcomponent Type ▶	**Midterm**	**CWS**	**CWS**	**100 Marks**
Maximum Marks ▶	**50**	**25**	**25**	
CO-1	X	X	X	X
CO-2	X	X	X	X
CO-3	X	X	X	X
CO-4				X
CO-5		X	X	X
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures
2.	Understanding	Class Room Lectures
3.	Critical Skills	Creative Work Submission
4.	Analytical Skills	Classroom Lectures, Creative Work Submission and Examination
5.	Problem Solving Skills	Examination and Creative Work

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		Submission
6.	Practical Skills	Class Room Lectures, Laboratory and Field
7.	Group Work	Work
8.	Self-Learning	Class Room Interaction
9.	Written Communication Skills	Creative Work Submission and Examination
10.	Verbal Communication Skills	Creative Work Submission and Examination
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Presentation
13.	Information Management	Interaction with peers and tutors
14.	Personal Management	Creative Work Submission, Presentation and Examination
15.	Leadership Skills	Interaction with peers and tutors

9. Course Resources

a. Essential Reading

1. Class Notes
2. Kelley, T. (2007) the Ten Faces of Innovation. Profile Business

b. Hill Recommended Reading

1. Bates M. S. (2011) The Social Innovation Imperative: Create Winning Products, Services, and Programs that Solve Society's Most Pressing Challenges. McGraw-Hill
2. Vinck, D. (2007) Everyday Engineering: An Ethnography of Design and Innovation. The MIT Press
4. Altshuller, G. (2006) And Suddenly The Inventor Appeared TRIZ, The Theory of Inventive Problem Solving, Technical Innovation Center
5. Hippel, E. V. (2006) Democratizing Innovation. The MIT Press
6. Mann, D. (2004) Hands On Systematic Innovation. Edward Gaskell Publishers
7. Benyus J. M. (2002) Biomimicry: Innovation Inspired by Nature. William Morrow Paperbacks
8. Bono, E. D. (1999) Serious Creativity: Using the Power of Lateral Thinking to Create New Idea. Harper Business

c. Magazines and Journals

1. Journal of Product Innovation Management, Publisher: Product Development and Management Association
2. International Journal of Innovation and Sustainable Development, Inderscience Publishers
3. The Journal of the International TRIZ Association, International TRIZ Association
4. Innovation Magazine
5. IDSA

d. Websites

1 www.pdesigni.com
2. www.systematic-innovation.com
3. www.businessweek.com/innovation-and-design

e. Other Electronic Resources

1. Personal computer
2. CREAX Innovation suite

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10. Course Organization

Course Code	19PRD506A		
Course Title	Creativity and Systematic Innovation		
Course Leader's Name		As per Timetable	
Course Leader's Contact Details		**Phone:**	+91-804-906-5555
		E-mail:	hod.id.ad@msruas.ac.in hod.fd.ad@msruas.ac.in
Course Specifications Approval Date		23-Oct-2020	
Next Course Specifications Review Date		May-2024	

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Course Specifications: Skill Enhancement Course-1

Course Title	Skill Enhancement Course-1
Course Code	19SEM501B
Course Type	Core Theory Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

The aim of this course is to provide opportunity for skill enhancement through exploration, practice and academic reflection catering to individual curiosity, ability and new learnings. The students may choose to participate in any one of the following,

- Art and Design exhibitions and shows
- National & International design competition
- Field / Industrial visit
- Mooc Course

2. Course Size and Credits:

Number of Credits	02
Credit Structure (Lecture: Tutorial: Practical)	0:0:2
Total Hours of Interaction	60
Number of Weeks in a Semester	16
Department Responsible	Industrial Design
Total Course Marks	50
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO 1. Synthesize the challenges and objectives of the chosen task
CO 2. Discuss the effectiveness of the task performed
CO 3. Prepare effective presentations to communicate ideas / concepts / new learnings

4. Course Contents

Unit 1 (Art and Design exhibitions and shows):
Participate in Art and Design exhibitions and shows in the creative field of study.
Exhibitions and shows may involve a physical exhibit in the form of displays / poster / model / video and such other art work

Unit 2 (National / International design competition): -
Participate in any National / International design competition relevant to the creative field of study
National / International design competition may involve a physical exhibit in the form of displays / poster / model / video and such other art work

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Unit 3 (Field / Industrial visit :): -
Visit industry / field in the creative field of study
Capturing / Studying /Understanding the essence & system of the place of the study

Unit 4 (Mooc Course): -
-Enroll in any Mooc Courses in the creative field of study
-Mooc Course may involve acquiring knowledge and upgrading skill in any chosen field of study

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	3	3								3	3			
CO-2			2		2								2	2		
CO-3	3	3			3					3			3	3	3	
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in Hours
Exhibition / Design Competition / Field work / Mooc Course	50
Presentation	10
Total Duration in Hours	60

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the B.Des (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

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Focus of COs on each Component or Subcomponent of Evaluation	
	Component 1: SEE (100% Weightage)
Subcomponent ▶	SC1
Subcomponent Type ▶	Component- 1 (Presentation, viva- voce)
Maximum Marks ▶	50
CO-1	X
CO-2	X
CO-3	X
The details of SC1, SC2, SC3 or SC4 are presented in the Programme Specifications Document.	

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester. Component -1 will be assessed by a team of examiners in final

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Exhibition / Design Competition / Field work / Mooc Course
2.	Understanding	Exhibition / Design Competition / Field work / Mooc Course
3.	Critical Skills	Exhibition / Design Competition / Field work / Mooc Course
4.	Analytical Skills	Exhibition / Design Competition / Field work / Mooc Course
5.	Problem Solving Skills	Exhibition / Design Competition / Field work / Mooc Course
6.	Practical Skills	Exhibition / Design Competition / Field work / Mooc Course
7.	Group Work	Exhibition / Design Competition / Field work / Mooc Course
8.	Self-Learning	Exhibition / Design Competition / Field work / Mooc Course
9.	Written Communication Skills	Report
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interaction during the data collection
13.	Information Management	Report
14.	Personal Management	Exhibition / Design Competition / Field work / Mooc Course
15.	Leadership Skills	Exhibition / Design Competition / Field work / Mooc Course

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9. Course Resources

a. Essential Reading

b. Recommended Reading

c. Magazines and Journals

d. Websites

e. Other Electronic Resources

10. Course Organization

Course Code	19SEM501B		
Course Title	Skill Enhancement Course - 1		
Course Leader's Name		As per Timetable	
Course Leader's Contact Details		Phone:	+91-804-906-5555
		E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date		23-Oct-2020	
Next Course Specifications Review Date		May-2024	

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Course Specifications: Ergonomics in Product Design

Course Title	Ergonomics in Product Design
Course Code	19PRD507B
Course Type	Core Theory Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

This Course prepares students to create human centric design solutions through application of ergonomic factors. Students will be taught fundamentals of ergonomics, product usability, displays & controls, hand tools, body movements, human errors and ergonomics of machines. Physical simulation for design solutions will be carried out using appropriate anthropometric data to validate ergonomic factors.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	2:0:2
Total Hours of Interaction	90
Number of Weeks in a Semester	15
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Apply a systematic approach to evaluate ergonomic factors in products / systems
CO-2. Analyse and identify deficiencies relating to ergonomic factors in products / systems
CO-3. Develop solutions to eliminate the deficiencies identified
CO-4. Evaluate and select the final solution to meet the desired ergonomic objectives
CO-5. Develop and validate the selected final solution to meet the desired ergonomic Solution

4. Course Contents

Unit 1 (Ergonomics): The definition and the origin of ergonomics. Scope of ergonomic design. Value of cognitive ergonomics. History of human factors. Classification and objective of human factors. Scope of HFE. Man machine environment system

Unit 2 (Product Usability): Product usability and its background. Stages of user interface evolution. Usability testing methods. How to do usability testing. What are the steps involved in usability testing.

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Unit 3 (Visual Display of Dynamic Information): The visual display of dynamic information. Uses of dynamic information. Quantitative visual displays. Design of pointers. Display design

Unit 4 (Auditory, tactual and olfactory displays): The hearing and intensity of sound. Decibel levels for various sounds. Auditory display and principles of auditory display. Characteristics and features certain type of audio. Alarms. Cutaneous and olfactory senses

Unit 5 (Body Movements): The types of body movements. The major classes of motor movements. Closed loop and open loop theory. Applied anthropometrics: work space design and seating. Use of Anthropometric data. Science of seating.

Unit 6 (Ergonomics of machines): The definition and the components of the work system. Ergonomic considerations in machine design. Suggested iterative approach to design. Physical workspace and control design. Display design and noise. Auditory signals. Location and layout.

Unit 7 (Human Errors and RSI): The human errors, the errors of omission and errors of commission. Sequence error. Factors contributing to accidents. Risk perception of accidents. What is RSI and what are the symptoms of RSI. Dynamic and static load. How to prevent RSI.

Unit 8 (Hand tools): The outline of hand tools. Bones of the hands and how they work. Movements of the hand. Hand injury and disorder. Shape, Orientation, Weight and Size, Texturing and Gloves.

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	1		1	2	1	1					1	1		2	
CO-2	1			1		1	3	2			1				3	3
CO-3	1	3	1	3	1	2	2	1	1	2		1	1	2	2	2
CO-4	1	2	3	3	2	1			1	2	1			1		2
CO-5	1	2	3	1	1	1	1	1		1	2	1				
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		30
Demonstrations		05
1. Demonstration using Videos	03	
2. Demonstration using Physical Models / Systems	00	
3. Demonstration on a Computer	02	
Tutorial		00
1. Tutorial	00	
Practical Work		45
1. Course Laboratory	45	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop /	00	

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Kitchen		
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		
1. Case Study Presentation	02	10
2. Guest Lecture	02	
3. Industry / Field Visit	06	
4. Brain Storming Sessions	00	
5. Group Discussions	00	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		**100**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Des. (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation				
	Component 1: CE (50% Weightage)			**Component 2: SEE (50% Weightage)**
Subcomponent ▶	**SC1**	**SC2**	**SC3**	
Subcomponent Type ▶	**Midterm**	**CWS**	**CWS**	**100 Marks**
Maximum Marks ▶	**50**	**25**	**25**	
CO-1	X			X
CO-2	X	X	X	X
CO-3	X	X	X	X
CO-4		X	X	X
CO-5		X	X	X
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

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S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures
2.	Understanding	Class Room Lectures
3.	Critical Skills	Assignment and Examination
4.	Analytical Skills	Assignment and Examination
5.	Problem Solving Skills	Assignment and Examination
6.	Practical Skills	Class Room Lectures, Assignment and Examination and Field Work
7.	Group Work	Class Room Interaction
8.	Self-Learning	Assignment and Examination
9.	Written Communication Skills	Assignment and Examination
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Class Room Interaction, Field Work
12.	Behavioral Skills	Field Work, Presentation
13.	Information Management	Assignment and Examination
14.	Personal Management	Class Room Interaction and Field Work
15.	Leadership Skills	Time management and achieving the learning outcomes

9. Course Resources

a. Essential Reading

1. Class Notes
2. Chakra arty D. (1999) Indian Anthropometric Dimensions for Ergonomic Design Practice, National Institute of Design
3. Stanton N. A. and Young M. S. (1999) Guide to Methodology in Ergonomics, Taylor and Francis

b. Recommended Reading

1. Caplan and Ralph. (2005) By Design Why there are no Locks on the Bathroom Doors in the Hotel Louis XIV and Other Object Lessons, FairChild publication
2. Dreyfuss H. (2003) Designing for People, Viking Press
3. Jordan P.W. (2002) Designing Pleasurable Products: An Introduction to the New Human Factors, Taylor and Francis
4. Noyes J. (2001) Designing for Humans, Psychology Press
5. Chakrabarty D. (1999) Indian Anthropometric Dimensions for Ergonomic Design Practice, National Institute of Design

c. Magazines and Journals

1. Theoretical Issues in Ergonomics Science, Taylor & Francis
2. Ergonomics, Taylor & Francis
3. Ergonomics Abstracts Online, Taylor & Francis
4. Ergonomics Abstracts, Taylor & Francis
5. Behaviour & Information Technology, Taylor & Francis
6. Work and Stress, Taylor & Francis

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d. Websites

1. www.ergonomics.org
2. www.handhelpers.com
3. www.osha.gov/SLTC/ergonomics/index.html
4. www.ise.org.in

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10. **Course Organization**

Course Code	19PRD507B	
Course Title	Ergonomics in Product Design	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	**Phone:**	+91-804-906-5555
	E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date	23-Oct-2020	
Next Course Specifications Review Date	May-2024	

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Course Specifications: Design for Manufacturing and Assembly

Course Title	Design for Manufacturing and Assembly
Course Code	19PRD521B
Course Type	Elective Theory Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

This Course deals with design for manufacturing and assembly by applying DFMA principles. Students will be taught DFMA techniques to simplify product structure, reduce assembly time and process, improve serviceability, and reduce cost and time to market. Principles of design for assembly and design for environment will be discussed. Students will use Boothroyd and Dewhurst DFMA software to evaluate designs.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	2:0:2
Total Hours of Interaction	90
Number of Weeks in a Semester	16
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO-1. Discuss use of appropriate materials and manufacturing process for a selected product
CO-2. Evaluate designs using DFMA guidelines
CO-3. Identify DFMA guidelines for manufacture and assembly
CO-4. Modify Design changes for improvement in assembly
CO-5. Compare the changes in Design
CO-6. Evaluate the Design changes in final assembly

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4. Course Contents

Unit 1 (DFMA overview Applications): DFMA product development process, Concurrent costing, Benefits of DFMA, Case studies. Computer aided manufacturing - Planning, Managing, Controlling.

Unit 2 (Design principles for manufacturability): Simplicity of design, Standard materials and components, Standardized product design, Teamwork across the organization, Avoidance of secondary operations, Process requirements.

Unit 3 (Materials and manufacturing processes): Capability of different manufacturing processes to produce part attributes for DFM and assembly attributes for DFA.

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Unit 4 (DFMA roadmap): Importance of DFMA in product design, Design architecture Assembly efficiency, Assembly systems, Assembly method, DFMA goals and Concurrent engineering.

Unit 5 (Design for Assembly guidelines): Principles of reducing parts, design alternatives, Part count reduction, Design for assembly with case studies/examples.

Unit 6 (Design for manual/automatic assembly): Design guidelines for manual assembly, Design guidelines for insertion and fastening and guidelines for ease of assembly-arranging, Standardizing and simplifying assembly operations with examples. Design for sheet metal parts, injection molding and die casting.

Unit 7 (Design for serviceability): Increase product reliability, Simplify design, Standard and interchangeable replacement parts, Design and process FMEA, Simplify service.

Unit 8 (Design for environment): Product life cycle, Design for environment, Benefits of eco design, Design considerations for product use, End of life, Materials, manufacturing, Disassembly, Recycling, Fastening guidelines, Environmental standards.

Unit 9 (Best practices for manufacturing processes): Design and manufacture with case studies/Examples.

Unit 10 (Laboratory): Analyzing the product structure and its parts design and assembly:

- Create the Product Structure of the given product
- Generate the engineering part list
- Define various DFMA principles that can be implemented in the given product and suggest for improvements
- Discuss on the Various DFMA guidelines adopted for Die casted parts of the given product and suggest for improvements
- Discuss on the serviceability aspects of the product and identify the serviceability guidelines already used in the product and suggest for improvements

Unit 10 (Laboratory): Analyze product using DFMA Software (Boothroyd Dewhurst) for product improvement:

- Deliver a presentation on the studied product with respect to product architecture, DFMA guidelines used and suggestion for improvements
- Discuss various DFMA software's available
- Define Product Structure of the given product
- Import data from CAD files in IGES format to DFMA software
- Analyze the Computer Aided Design (CAD) model
- Generate the Design for assembly (DFA index) and results
- Analyze the CAD model
- Generate the DFA index and results
- Generate 3D CAD model
- Import data from CAD files in IGES format to DFMA software
- Analyze the CAD model
- Generate the DFA index and results based on cost and assembly time

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5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3		1				2						3	1	2	
CO-2	2	3		1	2								2	2	2	
CO-3	2	3			2	2		2	2	2	2	2	2	2	2	
CO-4			3	2	2	2	3	2	2	2	2		2	3	3	
CO-5							2	1	2	3	3	2	2	2	3	2
CO-6							2		2	3	3	2	1	2	3	3

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		10
Demonstrations		20
1. Demonstration using Videos	10	
2. Demonstration using Physical Models / Systems	05	
3. Demonstration on a Computer	05	
Tutorial		00
1. Tutorial	00	
Practical Work		50
1. Course Laboratory	20	
2. Computer Laboratory	30	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		10
1. Case Study Presentation	03	
2. Guest Lecture	02	
3. Industry / Field Visit	00	
4. Brain Storming Sessions	02	
5. Group Discussions	03	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		**100**

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7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M. Des (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

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The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation				
	Component 1: CE (50% Weightage)			Component 2: SEE (50% Weightage)
Subcomponent ▶	SC1	SC2	SC3	
Subcomponent Type ▶	Midterm	CWS	CWS	100 Marks
Maximum Marks ▶	50	25	25	
CO-1	X			X
CO-2	X	X	X	X
CO-3	X	X	X	X
CO-4		X	X	X
CO-5		X	X	X
CO-6		X	X	
The details of SC1, SC2, SC3 are presented in the Programme Specifications Document.				

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Classroom lectures
2.	Understanding	Class Room Lectures
3.	Critical Skills	Creative Work Submission
4.	Analytical Skills	Classroom Lectures, Creative Work Submission and Examination
5.	Problem Solving Skills	Examination and Creative Work Submission
6.	Practical Skills	Class Room Lectures, Laboratory and Field
7.	Group Work	Work
8.	Self-Learning	Class Room Interaction
9.	Written Communication Skills	Creative Work Submission and Examination
10.	Verbal Communication Skills	Creative Work Submission and Examination
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Presentation
13.	Information Management	Interaction with peers and tutors
14.	Personal Management	Creative Work Submission, Presentation and Examination
15.	Leadership Skills	Interaction with peers and tutors

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9. Course Resources

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a. **Essential Reading**

1. Course notes
2. Harry Peck, "Designing for Manufacture", Pitman Publications, London, 1983.
3. Poka-Yoke, "Improving Product Quality by Preventing Defects", Productivity Press, 1992
4. Matousek R, "Engineering Design - A Systematic Approach", Blackie and Son Ltd.,London, 1974

b. **Recommended Reading**

1. John W. Priest and Jose Sanchez. (2001) Product Development and Design for Manufacturing, Marcell Decker.
2. G. Boothroyd and P. Dewhurst, Boothroyd Dewhurst, Inc. 1989 Marcell Dekker, Inc. 1994, Product Design for Manufacture and Assembly
3. G. Lewis and H. Connelly, Product Design for Assembly: The Methodology Applied
4. Boothroyd and P. Dewhurst, Product design for assembly: Boothroyd Dewhurst Incorporated, 1991.
5. B. D. Inc., Design for Assembly vol. Version 9.4. Rhode Island: Boothroyd Dewhurst Inc., 2009
6. Lucchetta, et al., "Integrated design analysis for product simplification," CIRP Annals- Manufacturing Technology, vol. 54, pp. 147-150, 2005

C. **Magazines and Journals**

1. Proceedings of the Institution of Mechanical Engineers Journal of Engineering Manufacture Published by Professional Engineering Publishing
2. CIRP Annals -Manufacturing Technology Published by International Academy for Production Engineering

D. **Websites**

1. https://www.dfma.com/

E. **Other Electronic Resources**

1. Personal computer
2. DFMA Software

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10. **Course Organization**

Course Code	19PRD521B	
Course Title	Design For Manufacturing and Assembly	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	**Phone:**	+91-804-906-5555
	E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date	23-Oct-2020	
Next Course Specifications Review Date	May-2024	

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Course Specifications: Dissertation and Publication

Course Title	Dissertation and Publication
Course Code	19PRD600B
Course Type	Theory Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

This Course is intended to give an insight to the students on application of principles of research methodology, preparation of research project proposal, research project management, execution of research project and effective technical communication and presentation. It also emphasizes the need and the relevance of a structured approach to identify a research topic and undertake research. This Course provides an opportunity for students to apply theories and techniques learnt during programme work. It involves in-depth work in the chosen area of study.

2. Course Size and Credits:

Number of Credits	20
Credit Structure (Lecture: Tutorial: Practical)	20:0:0
Total Hours of Interaction	1000
Number of Weeks in a Semester	26
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

- **CO 1.** Critically review scholarly literature collected from various sources for the project purpose and formulate a research problem
- **CO 2.** Prepare and present a research proposal
- **CO 3.** Conduct research to achieve research objectives
- **CO 4.** Propose new ideas/methodologies or procedures for further improvement of the research undertaken
- **CO 5.** Create research document and write research papers for publications
- **CO 6.** Defend the research findings in front of scholarly audience

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4. Course Contents

Unit 1 : Research Methodology

Unit 2 : Interaction with the users and collection of data

Unit 3: Project definition and project planning

Unit 4: Use of conceptual models and frameworks

Unit 5: Problem solving and Evaluation

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Unit 6 : Interpretations and drawing conclusions

Unit 7 : Proposing ideas or methods for further work

Unit 8 : Thesis writing

Unit 9 : Oral presentation

Unit 10: Authoring Research paper

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1		2			2								2	1		
CO-2										3	1		1			
CO-3					1	2				1			2			
CO-4										3			3			
CO-5								2			3					2
CO-6										2	3				1	3

6. Course Teaching and Learning Methods

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M. Des (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation		
	Component1: CE (50% Weightage)	Component2: SEE (50% Weightage)
Subcomponent ▶	SC1	Report submission
Subcomponent Type ▶	Presentation	100 Marks
Maximum Marks ▶	50	
CO-1	X	X
CO-2	X	X
CO-3	X	X
CO-4	X	X

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CO-5	x	x
CO-6	x	x

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Dissertation Work
2.	Understanding	Dissertation Work
3.	Critical Skills	Dissertation Work
4.	Analytical Skills	Dissertation Work
5.	Problem Solving Skills	Dissertation Work
6.	Practical Skills	Dissertation Work
7.	Group Work	Dissertation Work
8.	Self-Learning	Dissertation Work
9.	Written Communication Skills	Report Writing
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Dissertation Work
13.	Information Management	Dissertation Work
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcome

9. Course Resources

Essential Reading

1. Lecture Sessions on individual project, Thesis Preparation delivered by the concerned Head of Dept

10. Course Organization

Course Code	Dissertation and Publication	
Course Title	19PRD600B	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	**Phone:**	+91-804-906-5555
	E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date	23-Oct-2020	
Next Course Specifications Review Date	May-2024	

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Course Specifications: User Experience Design

Course Title	User Experience Design
Course Code	19PRD522B
Course Type	Professional Core Elective
Department	Industrial Design/Fashion Design
Faculty	Art and Design

1. Course Summary

This Course enables students in developing a design-centric approach to User Interface (UI) and User Experience (UX) design, enriching them to learn how to design eloquently, using imagery, type and colour, to create interfaces function with clarity and flawlessness. Students would learn industry-standard methods to approach the key theories and frameworks; also focusing on the creation of wireframes, high-fidelity mock-ups, and clickable prototypes.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	0:0:4
Total Hours of Interaction	100
Number of Weeks in a Semester	16
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

- **CO 1.** Discuss the adaptation of suitable design approaches and techniques in designing an interface
- **CO 2.** Identify appropriate colour, composition, structure and font required for interface
- **CO 3.** Analyse and critique the design of interactive products
- **CO 4.** Generate design concepts inspired from visual theme boards and personas
- **CO 5.** Apply design principles to effectively present and communicate design ideas
- **CO 6.** Demonstrate the application digital tool to visualize design concepts and visual mock-ups

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4. Course Contents

Unit 1 (Visual Elements of User Interface Design): relationship between UI and UX, roles in UI/UX, historical overview of interface design, interface conventions: theory, interface conventions: application, template vs. content, aesthetics & functionality, color and shape, typography, icons

Unit 2: Business Requirement and User Expectation, Competitive Research, Brainstorming techniques, Define Persona, Scenario. Task Flow & Story Boarding, User Research and Testing with User ,Heuristics Evaluation & Usability Testing, Web Accessibility, Analytics Review

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Unit 3(UI Design Process): Usability Engineering and Task-Centered Approaches, Personas, Tasks, and Scenarios, Design-Centered Methods, Card Sorting

Unit 4 (Psychology and Human Factors for UI Design): Design Principles, Visibility, Feedback, Mappings and Constraints.

Unit 5 (Case Study): UI Disasters, including GPS fails, Corporate Value: Citibank ATM, Microsoft Office 2007 Ribbon, International Children's Digital Library, Taxes and Tickets, Airbnb vs. Couch Surfing

Unit 6 (Wireframes to Prototypes and Visual Mockups): Introduction to Wireframes, Primary navigation, Design Principles, whitespace, Using whitespace to style a form, Mood boards, Web Fonts, Creating Visual Mockups and Clickable Prototypes.

Unit 7 (Mobile Design Approach): Understand Mobile Concept, Mobile Platforms, Designing for Native, Hybrid and Web Applications Designing for Android and iOS, Mobile Design Patterns (Navigation, Forms, Tables, Search, Sort & Filter, Tools, Charts), Understand Mobile Sizes and Icon sizes, Sketching/Paper Prototype (Practical and Exercise) Wireframe, Design Techniques

Unit 8 (Wireframes to Prototypes and Visual Mockups): Introduction to Wireframes, Primary navigation, Design Principles, whitespace, Using whitespace to style a form, Mood boards, Web Fonts, Creating Visual Mockups and Clickable Prototypes.

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	1			2	2											
CO-2		2														
CO-3		2	2													
CO-4		1	3		2									2		
CO-5	3									3			3			
CO-6					3					2				3		
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		10
Demonstrations		- 20
1. Demonstration using Videos	05	
2. Demonstration using Physical Models / Systems	09	
3. Demonstration on a Computer	06	
Tutorial		00
1. Tutorial	00	
Practical Work		45
1. Course Laboratory	25	
2. Computer Laboratory	20	

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3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		
1. Case Study Presentation	03	15
2. Guest Lecture	05	
3. Industry / Field Visit	02	
4. Brain Storming Sessions	00	
5. Group Discussions	05	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		**100**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Des. (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation		
	Component 1: CE (50% Weightage)	Component 2: SEE (50% Weightage)
Subcomponent ▶	SC1	50 Marks
Subcomponent Type ▶	CWS	
Maximum Marks ▶	25	
CO-1		x
CO-2	x	x
CO-3	x	x
CO-4	x	x
CO-5	x	x
CO-6	x	x

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

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8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course

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Unit 3(UI Design Process): Usability Engineering and Task-Centered Approaches, Personas, Tasks, and Scenarios, Design-Centered Methods, Card Sorting

Unit 4 (Psychology and Human Factors for UI Design): Design Principles, Visibility, Feedback, Mappings and Constraints.

Unit 5 (Case Study): UI Disasters, including GPS fails, Corporate Value: Citibank ATM, Microsoft Office 2007 Ribbon, International Children's Digital Library, Taxes and Tickets, Airbnb vs. Couch Surfing

Unit 6 (Wireframes to Prototypes and Visual Mockups): Introduction to Wireframes, Primary navigation, Design Principles, whitespace, Using whitespace to style a form, Mood boards, Web Fonts, Creating Visual Mockups and Clickable Prototypes.

Unit 7 (Mobile Design Approach): Understand Mobile Concept, Mobile Platforms, Designing for Native, Hybrid and Web Applications Designing for Android and iOS, Mobile Design Patterns (Navigation, Forms, Tables, Search, Sort & Filter, Tools, Charts), Understand Mobile Sizes and Icon sizes, Sketching/Paper Prototype (Practical and Exercise) Wireframe, Design Techniques

Unit 8 (Wireframes to Prototypes and Visual Mockups): Introduction to Wireframes, Primary navigation, Design Principles, whitespace, Using whitespace to style a form, Mood boards, Web Fonts, Creating Visual Mockups and Clickable Prototypes.

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	1			2	2											
CO-2		2														
CO-3		2	2													
CO-4		1	3		2									2		
CO-5	3									3			3			
CO-6					3					2				3		
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		10
Demonstrations		20
1. Demonstration using Videos	05	
2. Demonstration using Physical Models / Systems	09	
3. Demonstration on a Computer	06	
Tutorial		00
1. Tutorial	00	
Practical Work		45
1. Course Laboratory	25	
2. Computer Laboratory	20	

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Course Specifications: Skill Enhancement Course-2

Course Title	Skill Enhancement Course-2
Course Code	19SEM501B
Course Type	Core Practical Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

The aim of this course is to provide opportunity for skill enhancement through exploration, practice and academic reflection catering to individual curiosity, ability and new learnings. The students may choose to participate in any one of the following,

- Art and Design exhibitions and shows
- National & International design competition
- Field / Industrial visit
- Mooc Course

2. Course Size and Credits:

Number of Credits	02
Credit Structure (Lecture: Tutorial: Practical)	0:0:2
Total Hours of Interaction	60
Number of Weeks in a Semester	16
Department Responsible	Industrial Design
Total Course Marks	50
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

CO 1. Synthesize the challenges and objectives of the chosen task
CO 2. Discuss the effectiveness of the task performed
CO 3. Prepare effective presentations to communicate ideas / concepts / new learnings

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4. Course Contents

Unit 1 (Art and Design exhibitions and shows):
Participate in Art and Design exhibitions and shows in the creative field of study.
Exhibitions and shows may involve a physical exhibit in the form of displays / poster / model / video and such other art work

Unit 2 (National / International design competition): -
Participate in any National / International design competition relevant to the creative field of study
National / International design competition may involve a physical exhibit in the form of displays / poster / model / video and such other art work

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1.	Knowledge	Class room Lecture and Case Studies
2.	Understanding	Class room Lecture and Demonstration
3.	Critical Skills	Creative Work Submission, presentations
4.	Analytical Skills	Classroom interaction and Examination
5.	Problem Solving Skills	Creative Work Submission
6.	Practical Skills	Classroom lecture, lab work, field work
7.	Group Work	Classroom interaction
8.	Self-Learning	Creative Work Submission
9.	Written Communication Skills	Creative Work Submission and Examination
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Course
13.	Information Management	Creative Work Submission , Examination and Field work
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

a. Essential Reading

1. Class Notes
2. Mandel. T (1997) The Elements of User Interface Design, John Wiley and Sons Ltd
3. Wilbert O. Galitz (2002) The Essential Guide To User Interface Design, Wiley

b. Recommended Reading

1. Tidwell J. (2005) Designing Interfaces: Patterns for Effective Interaction Design, O'Reilly Media, Inc.
2. Krishna G. (2015) The Best Interface Is No Interface, New Riders
3. Head V. (2016) Designing Interface Animation: Meaningful Motion for User Experience, Rosenfeld Media; 1st edition
4. Hackos J. T. & Redish J. C. (2008) User and Task Analysis for Interface Design, Wiley

c. Other Electronic Resources

1. Personal Computer, Drawing/ Sketching, Digital Tablet

10. Course Organization

Course Code	19PRD522B		
Course Title	User Experience Design		
Course Leader's Name		As per Timetable	
Course Leader's Contact Details		**Phone:**	+91-804-906-5555
		E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date		23-Oct-2020	
Next Course Specifications Review Date		May-2024	

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Focus of COs on each Component or Subcomponent of Evaluation	
	Component 1: SEE (100% Weightage)
Subcomponent ▶	SC1
Subcomponent Type ▶	Component- 1 (Presentation, viva- voce)
Maximum Marks ▶	50
CO-1	X
CO-2	X
CO-3	X
The details of SC1, SC2, SC3 or SC4 are presented in the Programme Specifications Document.	

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester. Component -1 will be assessed by a team of examiners in final

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Exhibition / Design Competition / Field work / Mooc Course
2.	Understanding	Exhibition / Design Competition / Field work / Mooc Course
3.	Critical Skills	Exhibition / Design Competition / Field work / Mooc Course
4.	Analytical Skills	Exhibition / Design Competition / Field work / Mooc Course
5.	Problem Solving Skills	Exhibition / Design Competition / Field work / Mooc Course
6.	Practical Skills	Exhibition / Design Competition / Field work / Mooc Course
7.	Group Work	Exhibition / Design Competition / Field work / Mooc Course
8.	Self-Learning	Exhibition / Design Competition / Field work / Mooc Course
9.	Written Communication Skills	Report
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interaction during the data collection
13.	Information Management	Report
14.	Personal Management	Exhibition / Design Competition / Field work / Mooc Course
15.	Leadership Skills	Exhibition / Design Competition / Field work / Mooc Course

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Unit 3 (Field / Industrial visit :): -
Visit industry / field in the creative field of study
Capturing / Studying /Understanding the essence & system of the place of the study

Unit 4 (Mooc Course): -
-Enroll in any Mooc Courses in the creative field of study
-Mooc Course may involve acquiring knowledge and upgrading skill in any chosen field of study

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	3	3	3	3								3	3			
CO-2			2		2								2	2		
CO-3	3	3			3					3			3	3	3	
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in Hours
Exhibition / Design Competition / Field work / Mooc Course	50
Presentation	10
Total Duration in Hours	60

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the B.Des (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

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Course Specifications: Portfolio Design and Presentation

Course Title	Portfolio Design and Presentation
Course Code	19PRD531B
Course Type	Core Course
Department	Industrial Design/Fashion Design
Faculty	Art and Design

1. Course Summary

The aim of the course is to enable students with a foundation in graphic design to develop skills to create and present their idea. The students are taught the process of representing images used to communicate ideas through visually. They are also thought the fundamentals of graphic design. The students are trained to prepare portfolio presentations.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	0:0:4
Total Hours of Interaction	120
Number of Weeks in a Semester	15
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

- **CO-1.** Describe the process required to develop a portfolio
- **CO-2.** Explain the importance of portfolio
- **CO-3.** Design and develop mood, color, swatch and inspiration boards for developed designs and products
- **CO-4.** Develop effective and cogent information graphics using digital tools
- **CO-5.** Create visual representations and finished designs for presentation work

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4. Course Contents

Unit 1 (Portfolio): Different types of portfolios, Different portfolio layout and media

Unit 2 (Crash Course in Aesthetics): Line weight, Color schemes, Typography, Scale and juxtaposition, graphic elements

Unit 3 (Design Boards): Product Development Inspiration board, Mood Board, Color Board, Story Board, Theme Board, Client Board, Swatch board, Spec sheet

Unit 4 (Layout): Collection and organizing of designs/ products for showcasing with inspiration details, Type groups, styles and applications, Spaces, leading and kerning, Alignments paragraphs and margins, Layout, grids and pages

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9. Course Resources

a. Essential Reading

b. Recommended Reading

c. Magazines and Journals

d. Websites

e. Other Electronic Resources

10. Course Organization

Course Code	19SEM501B	
Course Title	Skill Enhancement Course - 2	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	Phone:	+91-804-906-5555
	E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date	23-Oct-2020	
Next Course Specifications Review Date	May-2024	

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4. Brain Storming Sessions	02	
5. Group Discussions	03	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		**130**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Des. (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation			
	Component 1: CE (50% Weightage)		**Component 2: SEE (50% Weightage)**
Subcomponent ▶	**SC1**	**SC2**	
Subcomponent Type ▶	**CWS**	**CWS**	**50 Marks**
Maximum Marks ▶	**25**	**25**	
CO-1			x
CO-2			x
CO-3	x	x	
CO-4	x	x	
CO-5	x	x	x
The details of SC1, SC2, SC3 or SC4 are presented in the Programme Specifications Document.			

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Laboratory
2.	Understanding	Laboratory
3.	Critical Skills	Laboratory Instructions and Demonstrations
4.	Analytical Skills	Laboratory and Examination
5.	Problem Solving Skills	Creative Work Submission, Laboratory and Examination
6.	Practical Skills	Laboratory
7.	Group Work	Laboratory
8.	Self-Learning	Laboratory
9.	Written Communication Skills	Creative Work Submission and Examination

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Unit 5 (Presentation-1): Mock-ups, thumbnails and visual concepts, Positive and Negative space, Proximity and Alignment, Contrast and Hierarchy, Image development, Layout, text and type, Manual art work techniques, Mounting and presentation, animation and motion graphics

Unit 6 (Presentation-2): Demonstration and presentation of illustration (with line/block/flesh sketches), spec sheet details for the final collection, application of design principles and elements in creating layout for portfolio presentations, online portfolio, Print basics

Unit 7 (Vector Graphics): Shapes and paths, the vector graphic building blocks, How to use Illustrator, vector graphics to the "Paper", Vector graphic attributes. Create detailed vector graphics, Work with appropriate filetypes Prepare files for print and web

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1								2				1				
CO-2										1						
CO-3	2		3													
CO-4				2										2		
CO-5										3					3	
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		00
Demonstrations		20
1. Demonstration using Videos	05	
2. Demonstration using Physical Models / Systems	15	
3. Demonstration on a Computer	00	
Tutorial		00
1. Tutorial	00	
Practical Work		90
1. Course Laboratory	90	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		
1. Case Study Presentation	05	
2. Guest Lecture	00	
3. Industry / Field Visit	00	

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Course Specifications: Interactive Design and Technology

Course Title	Interactive Design and Technology
Course Code	19PRD512B
Course Type	Professional Core Elective
Department	Industrial Design/Fashion Design
Faculty	Art and Design

1. Course Summary

This Course prepares students to create human centric design solutions using various mediums of technology, artificial intelligence and art and their application in creating new interactive products and interfaces. Students will be taught the fundamentals of how technology and design, new interface development, integration of technology art and design. A representative, digital or physical simulation of the proposed new interface design has to be carried out using appropriate design and technology to validate products designed for the future.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	0:0:4
Total Hours of Interaction	100
Number of Weeks in a Semester	16
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

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CO 1. Determine different technological advances, their applications and influences in alternative design of products and systems
CO 2. Evaluate and Identify technological and product deficiencies in products and systems
CO 3. Analyse and Apply solutions to technological and product deficiencies in products and systems
CO 4. Evaluate and Develop new design scenarios to meet interactive design objectives
CO 5. Develop and validate the selected final solution to meet the desired interactive design and technology solutions

4. Course Contents

Unit 1 (Design and Technology): Origin, Evolution and Integration of Technology in Design

Unit 2 (Influence of Design and Technology in Product Design): Effect of Advancement of technology on the design of products. Rapid Prototyping technology and its influence in the design cycle

Unit 3(Upcycling in Design): Advancement and enhancement of upcycling design principles in product design with the help of technology

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10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interaction with peers and tutors
13.	Information Management	Examination and presentation
14.	Personal Management	Interaction and discipline
15.	Leadership Skills	Interaction with peers and tutors

9. **Course Resources**

a. **Essential Reading**

1. Class Notes
2. Michael J. (2013), Burn Your Portfolio: Stuff They Don't Teach You in Design School, New Riders

b. **Recommended Reading**

1. Craig W. (2013), Design/Portfolio: Self Promotion at Its Best, Hachette Book Group
2. Carolyn K. , Jessica G., (2010), The Graphic Design Exercise Book, HOW Books

c. **Magazines and Journals**

d. **Websites**

1. www.behance.com
2. www. Coroflot.com
3. www.core77.com
4. www.dezeen.com
5. www.issuu.com

e. **Other Electronic Resources**

10. **Course Organization**

Course Code	19PRD531B	
Course Title	Portfolio Design and Presentation	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	**Phone:**	+91-804-906-5555
	E-mail:	hod.id.ad@msruas.ac.in hod.fd.ad@msruas.ac.in
Course Specifications Approval Date	23-Oct-2020	
Next Course Specifications Review Date	May-2024	

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Practical Work		45
1. Course Laboratory	45	
2. Computer Laboratory	00	
3. Engineering Workshop / Course/Workshop / Kitchen	00	
4. Clinical Laboratory	00	
5. Hospital	00	
6. Model Studio	00	
Others		15
1. Case Study Presentation	03	
2. Guest Lecture	05	
3. Industry / Field Visit	02	
4. Brain Storming Sessions	00	
5. Group Discussions	05	
6. Discussing Possible Innovations	00	
Term Tests, Laboratory Examination/Written Examination, Presentations		10
Total Duration in Hours		**100**

7. Course Assessment and Reassessment

The details of the components and subcomponents of course assessment are presented in the Programme Specifications document pertaining to the M.Des. (Product Design) Programme. The procedure to determine the final course marks is also presented in the Programme Specifications document.

The evaluation questions are set to measure the attainment of the COs. In either component (CE or SEE) or subcomponent of CE (SC1, SC2, SC3 or SC4), COs are assessed as illustrated in the following Table.

Focus of COs on each Component or Subcomponent of Evaluation		
	Component 1: CE (50% Weightage)	**Component 2: SEE (50% Weightage)**
Subcomponent ▶	**SC1**	
Subcomponent Type ▶	**CWS**	**50 Marks**
Maximum Marks ▶	**25**	
CO-1		x
CO-2	x	x
CO-3	x	x
CO-4	x	x
CO-5	x	x

The Course Leader assigned to the course, in consultation with the Head of the Department, shall provide the focus of COs in each component of assessment in the above template at the beginning of the semester.

Course reassessment policies are presented in the Academic Regulations document.

8. Achieving COs

The following skills are directly or indirectly imparted to the students in the following teaching and learning methods:

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Unit 4 (Intersection of Design and Technology): – Design influencing technological advancements and futuristic concepts of product design. Technology propelling advancements in futuristic concepts of product design. Failure of Design and Technology to work in tandem with system level design and in products

Unit 5 (Psychology of the Digital Influence of Products): Understanding Psychology of consumers in a digital age. Advancement and impact of psychology in designing products with respect to technology

Unit 6 (Trend Forecasting in Design and Technology): Trend Forecasting in Design. Trend Forecasting in Technology. Application of Trend Forecasting in Design and Technology

Unit 7 (Interactive Design): Origin, Evolution and in Analogue and Digital Products, Interactive Design Principles, Confluence of Industrial Design and Interactive Design

Unit 8 (Interactive Design in Design Subsets): Interactive Design in Art, New Media Art, Interactive Media Design, Advertising and Interactive Design, Gesture Control and Recognition Design, Art Space Design, Interactive Space and Museum Design, Static and Kinetic Installations

Unit 9 (Artificial Intelligence in Design): Introduction to Artificial Intelligence, Application of AI in Industrial Design, Automation in Industrial Design, Algorithms based design, Controlled Self-Learning in Products and Design, Internet of Things, Home Automation, Automobile Automation, Industrial design inclusion in Robotics and Video Games

Unit 10 (Trend Forecasting in Interactive Design): Trend Forecasting in Interactive Design, Application of Trend Forecasting in Interactive Design, New Product Integration and Development

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1					1										3	
CO-2		3		2											2	
CO-3					2											
CO-4	1		3							2				3		
CO-5	1		3								2			3		
3: Very Strong Contribution, 2: Strong Contribution, 1: Moderate Contribution																

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in hours	Total Duration in Hours
Face to Face Lectures		10
Demonstrations		20
1. Demonstration using Videos	05	
2. Demonstration using Physical Models / Systems	15	
3. Demonstration on a Computer	00	
Tutorial		00
1. Tutorial	00	

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10. Nathan Shedroff (2009) Design Is The Problem: The Future of Design Must Be Sustainable, : LouisRosenfield
11. Susan Yelavich, Barbara Adams (2014) Design as Future-Making, : Bloomsbury Academic.
12. Tim Parsons (2009) Thinking: Objects: Contemporary Approaches to Product Design, :Bloomsbury Publishing.

c. Magazines and Journals

1. The Design Journal
2. Azure
3. Dezeen

d. Websites

1. https://www.designboom.com/
2. https://www.yankodesign.com/
3. https://www.dexigner.com/

e. Other Electronic Resources

1. Personal Computer, Drawing tools, Model making materials (PU foam, POP, ThermocolCard Board etc.) and tools

10. Course Organization

Course Code	19PRD512B	
Course Title	Interactive Design and Technology	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	**Phone:**	+91-804-906-5555
	E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date	23-Oct-2020	
Next Course Specifications Review Date	May-2024	

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S. No	Curriculum and Capabilities Skills	How imparted during the course
1.	Knowledge	Class room Lecture and Case Studies
2.	Understanding	Class room Lecture and Demonstration
3.	Critical Skills	Creative Work Submission, presentations
4.	Analytical Skills	Classroom interaction and Examination
5.	Problem Solving Skills	Creative Work Submission
6.	Practical Skills	Classroom lecture, lab work, field work
7.	Group Work	Classroom interaction
8.	Self-Learning	Creative Work Submission
9.	Written Communication Skills	Creative Work Submission and Examination
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Course
13.	Information Management	Creative Work Submission , Examination and Field work
15.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

a. Essential Reading

1. Jonathan Follett (2014) Designing for Emerging Technologies UX for Genomics, Robotics, and the Internet of Things, : O'Reilly Media
2. Jonathan Follett (May 2015) The Future of Product Design, : O'Reilly Media, Inc.
3. Lorraine Justice (2019) The Future of Design: Global Product Innovation for a Complex World, United Kingdom: Hachette
4. Lorraine Justice (2012) China's Design Revolution, 1st edn., : The MIT Press
5. Stéphane Vial (Author), Patsy Baudoin (Translator) (2019) Being and the Screen: How the Digital Changes Perception. Published in One Volume With a Short Treatise on Design (Design Thinking, Design Theory), The MIT Press

b. Recommended Reading

1. Bonnie Nichols, NEA Office of Research & Analysis (August 2013) Valuing the Art of Industrial Design, Washington, D.C: National Endowment for the Arts
2. Herbert Birkhofer (2011) The Future of Design Methodology, London: Springer.
3. Arlindo Silva, Ricardo Simoes (2010) Handbook of Research on Trends in Product Design and Development: Technological and Organizational Perspectives, Hershey, PA, USA: Business Science Reference
4. SendPoints (2017) Smart Product Design, : Sendpoints Publishing Company Limited.
5. Chung, Wayne C (2019) The Praxis of Product Design in Collaboration with Engineering, : Springer International Publishing.
6. Grace Lees-Maffei (n.d.) Iconic Designs: 50 Stories about 50 Things, : Bloomsbury Publishing
7. Lucienne Blessing, A.J. Qureshi, Kilian Gericke (2016) The Future of Transdisciplinary Design: Proceedings of the Workshop on "The Future of Transdisciplinary Design", University of Luxembourg 2013, : Springer International Publishing.
8. Wolfgang Joensson (2018) Iconix: Exceptional Product Design: Skyhorse.
9. Don Norman (2009) The Design of Future Things, : Basic Books.

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Unit 1: Collection of relevant literature and review of literature

Unit 2: Interaction with the users and collection of data

Unit 3: Data Analysis, Formulation of a problem of suitable size based on customer voice

Unit 4: Prepare the product design specifications

Unit 5: Generate the concepts and detail design of concepts

Unit 6: Choosing a modelling environment, learning the appropriate tools and techniques

Unit 7: Modelling, simulation and analysis of design

Unit 8: Defining performance parameters, Evaluation of performance, presentation of performance characteristics through customer feedback

5. Course Map (CO-PO-PSO Map)

	Programme Outcomes (POs)												Programme Specific Outcomes (PSOs)			
	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12	PSO-1	PSO-2	PSO-3	PSO-4
CO-1	2	2	3	3	3	3	3	2	1				3	2		1
CO-2	3												3	2		1
CO-3	2	3	2	2			2	2	2	2	2	3	3	1		1
CO-4	3	2	3	1	3	2	2	2	2	3	2	2	3	1		1
CO-5	3	2	1	2	1	2	2	1	2	3	3	3	3	3	3	1
CO-6	2	2	3	3	3	3	3	2	1			1	3	2		1

6. Course Teaching and Learning Methods

Teaching and Learning Methods	Duration in Hours
Literature collection, review of literature, Developing questionnaires, analysis of data and defining and user study	20
Prepare the product design brief	20
Ideate design concept	30
Create and rendered 3D models	30
Select the final concept	10
Take the user feed back	10
Demonstration, Presentation and technical report writing	10
Total Duration in Hours	130

Registrar
M.S.Ramaiah University of Applied Sciences
Bangalore-560 054

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Faculty of Art and Design
M.S. Ramaiah University of Applied Sciences
Bangalore-560058

Dean - Academics
M.S. Ramaiah University of Applied Sciences
Bangalore-560054

Course Specifications: Industry Internship / Mini Project

Course Title	Industry Internship / Mini Project
Course Code	19PDC595B
Course Type	Core Practical Course
Department	Industrial Design
Faculty	Art and Design

1. Course Summary

The aim of this Course is to make a student experience an industrial or business environment. The student will visit various departments of an industry/business and observe the activities in each department for a certain duration of time and try to relate his/her experience with the theory practiced back at the faculty. The student should develop a report and make a presentation on his/her experience at the industry/business.

Alternatively,

The aim of this course is to give students an experience of identifying problems based on consumer requirements and generate the product design brief, concepts, 3D models and digitally render the product for visualisation. The students are expected to work individually and are required to develop an appropriate solution by identifying a problem for better design outcome. They also develop technical reports documenting the project work.

2. Course Size and Credits:

Number of Credits	04
Credit Structure (Lecture: Tutorial: Practical)	0:0:4
Total Hours of Interaction	130
Number of Weeks in a Semester	15
Department Responsible	Industrial Design
Total Course Marks	100
Pass Criterion	As per the Academic Regulations
Attendance Requirement	As per the Academic Regulations

3. Course Outcomes (COs)

After the successful completion of this course, the student will be able to:

- **CO-1.** Define the need for developing or improving the design of an existing product through an organized survey of literature
- **CO-2.** Synthesize the product design brief
- **CO-3.** Create solutions by developing concepts for the product to meet the product design brief
- **CO-4.** Prepare product digital renderings and technical report for presentation
- **CO-5.** Evaluate the design

4. Course Contents

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6.	Practical Skills	Project work/ Internship
7.	Group Work	Project work/ Internship
8.	Self-Learning	Project work/ Internship
9.	Written Communication Skills	Report
10.	Verbal Communication Skills	Presentation
11.	Presentation Skills	Presentation
12.	Behavioral Skills	Interaction with staff of the organization
13.	Information Management	Report
14.	Leadership Skills	Effective management of learning, time management, achieving the learning outcomes

9. Course Resources

a. Essential Reading

1. Organization website
2. Discussions with Managers/Mentor/Supervisor of different departments of the organization

10. Course Organization

Course Code	19PRD595B	
Course Title	Industry Internship / Mini Project	
Course Leader's Name	As per Timetable	
Course Leader's Contact Details	**Phone:**	+91-804-906-5555
	E-mail:	hod.id.ad@msruas.ac.in
Course Specifications Approval Date	23-Oct-2020	
Next Course Specifications Review Date	May-2024	

Registrar
M.S.Ramaiah University of Applied Sciences
Bangalore - 560 054

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