Scheme & Syllabus

Bachelor in Design (Product Design)

Course Credits

Year II: Semester 3

S. No	Course Code	Course Name	Type	L	T	P	Hours	Credits
1	3DS101	Object as History	BS	2	0	0	2	2
2	3DS102	Introduction to Ergonomics in Design	PC1	2	1	2	5	3 + 1P = 4
3	3DS103	Design Arts and Aesthetics	PC2	2	0	2	4	2 + 1P =3
4	3DS104	Materials and Processes for Model making	PC3	2	1	0	3	3
5	3DS105	Engineering for Designers	PC4	2	0	2	4	2+1P=3
6	3DS106	Exploratory Design Methods	PC5	2	0	2	4	2 + 1P = 3
7	3DS107	Lab./Workshop(Materials and Processes for Model making)	PC6	0	0	4	4	2P
8	3DSIK08	Principles of Ethical Design	IK1	1	1	0	2	2
		Total		13	3	12	28	22

DEVI AHILYA VISHWAVIDYALAYA INSTITUTE OF DESIGN (DAVID) **DAVV, Indore, India**				B. Des II Year Semester- III			
Course Code & Name	**Instructions Hours per Week**			**Credits**			
3DS101:	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Object as History	**2**	**0**	**0**	**2**	**0**	**0**	**2**
Duration of Theory Paper: 3Hours							

Course Objective:
The course is designed:

1. To trace evolution of product design through historical movements
2. To analyze technological influences on everyday objects
3. To develop contextual analysis skills for product types
4. To understand major design philosophies
5. To connect history with contemporary sustainable design

COURSE OF CONTENTS

Unit 1: Pre-industrial revolution design

- Craft traditions, Art Nouveau movement
- Form, ornamentation, material influences
- Artisanal to industrial transition

Unit 2: Industrial revolution origins

- Mass production, factory aesthetics
- Bauhaus pioneers, functionalism
- Early 20th century design manifestos

Unit 3: Modernism & cultural identities

- International Style, Scandinavian design
- Japanese wabi-sabi, minimalism principles
- Cultural design philosophies

Unit 4: Post-war & mid-century modern

- Material rationing effects on form
- Mid-century optimism aesthetics
- Streamline design influences

Unit 5: Contemporary paradigms

- Post-modernism reaction
- Sustainable design movement
- Digital age design; product analysis (chair/phone)

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

CO1: Analyze pre-industrial design influences

CO2: Understand industrial revolution impact

CO3: Compare international design philosophies

CO4: Trace post-war design evolution

CO5: Apply historical analysis to products

CO-PO Relationship

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	3	1	2	1	-	-	1
CO2	2	3	3	3	2	2	1	1	2	-	-	-
CO3	2	3	2	2	1	3	2	2	3	-	-	2
CO4	3	2	3	3	3	2	1	1	2	-	-	1
CO5	2	3	3	2	2	3	2	3	3	1	1	3

BOOKS RECOMMENDED:

1. "A History of Industrial Design" - Jensen-Rise
2. "The Story of Design" - Charlotte Fiell
3. "Design of the 20th Century" - Fiell & Fiell
4. "Bauhaus 1919-1933" - Magdalena Droste

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Course Code & Name	**Instructions Hours per Week**			**Credits**			
3DS102:	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Introduction to Ergonomics in Design	**2**	**1**	**2**	**2**	**1**	**2**	23+ 1P =4
Duration of Theory Paper: 3Hours							

Course Objective:

1. Define ergonomics scope and anthropometric principles
2. Apply physical ergonomics for workspace optimization
3. Understand cognitive ergonomics and biomechanics
4. Design inclusive products for diverse populations
5. Minimize user stress through MMI design

Pre requisite(s): Human anatomy basics

COURSE OF CONTENTS

Unit 1: Ergonomics fundamentals

- Definition, scope, historical development
- Anthropometry, body dimension systems
- Human variability, percentile design

Unit 2: Physical ergonomics

- Human factors, workspace design
- Posture analysis, neutral positioning
- Force limits, repetitive motion risks

Unit 3: Cognitive & biomechanical

- Mental workload, attention ergonomics
- Biomechanics: HIP analysis, joint stress
- Work condition posture analysis

Unit 4: Inclusive design

- Elderly, disabled user requirements
- Universal design principles
- Adaptive design strategies

Unit 5: Stress minimization

- Physical/mental stress reduction
- Display design, data processing
- Man-machine interface principles

Course Outcome:

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

CO1: Apply anthropometric data

CO2: Design ergonomic workspaces

CO3: Analyze cognitive workloads

CO4: Create inclusive designs

CO5: Optimize MMI interfaces

CO-PO Relationship (3-Strong, 2-Medium, 1-Small)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	2	3	2	-	-	1	-	-	-
CO2	2	2	2	3	3	1	2	1	2	-	-	1
CO3	1	3	2	2	2	3	1	1	1	-	-	2
CO4	2	2	1	3	2	2	2	2	3	1	1	3
CO5	3	1	3	3	2	1	1	2	2	-	-	1

BOOKS RECOMMENDED:

1. "The Design of Everyday Things" - Don Norman
2. "Human Factors in Product Design" - W. Green
3. "Ergonomics for Beginners" - J. Dillon

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Course Code & Name	**Instructions Hours per Week**			**Credits**			
3DS103:	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Design Arts and Aesthetics							
Duration of Theory Paper: 3Hours	**2**	**0**	**2**	**2**	**0**	**2**	2 + 1P = 3

Course Objective:

1. Master elements of form creation
2. Apply aesthetic principles to products
3. Understand color theory applications
4. Analyze material psychology effects
5. Implement advanced aesthetic techniques

Pre requisite(s): Basic drawing skills

COURSE OF CONTENTS

Unit 1: Elements of form

- Point, line, plane fundamentals
- Extrude, revolve, basic solid generation
- Form manipulation techniques

Unit 2: Aesthetic principles

- Unity, balance, proportion principles
- Rhythm, emphasis in product design
- Scale relationships

Unit 3: Color theory & semantics

- Color psychology, harmony rules
- Product semantics and meaning
- Cultural color associations

Unit 4: Material & surface

- Material finishes, tactile qualities
- Signs, symbols psychology

- Surface treatment effects

Unit 5: Advanced techniques

- Fillets, aesthetic features
- Geometric Dimensioning & Tolerancing (GDT)
- Professional presentation techniques

Course Outcome:

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

CO1: Create basic 3D forms

CO2: Apply aesthetic principles

CO3: Use color semantically

CO4: Select material finishes

CO5: Implement GDT standards

CO-PO Relationship

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	3	1	2	1	-	1	-	-	-	-
CO2	2	3	3	2	1	2	1	2	1	-	-	1
CO3	1	3	3	2	1	3	1	2	2	-	-	1
CO4	2	2	2	2	3	2	2	1	3	1	-	2
CO5	3	1	2	1	3	1	1	3	2	-	2	1

BOOKS RECOMMENDED:

1. "Universal Principles of Design" - Lidwell
2. "Design Form and Chaos" - Paul Rand
3. "The Aesthetics of Design" - Jane Forsey

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Course Code & Name	**Instructions Hours per Week**			**Credits**			
3DS104:	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Materials and Processes for Model Making	**2**	**1**	**0**	**2**	**1**	**0**	3
Duration of Theory Paper: 3Hours							

Course Objectives

- To familiarize students with different model-making materials
- To develop skills in material handling and fabrication techniques
- To understand material properties and process suitability
- To build competence in prototyping and physical visualization

COURSE OF CONTENTS

Unit 1: Introduction to Model Making & Materials

- Role of model making in product design
- Types of models: conceptual, functional, presentation
- Scale, proportion, and accuracy
- Overview of materials:
  - Paper and boards
  - Wood (softwood, MDF, plywood)
  - Plastics (acrylic, foam, PVC)
  - Clay and plaster
- Workshop safety practices

Unit 2: Tools, Equipment and Material Handling

- Hand tools: cutters, saws, files, drills
- Measuring instruments: scale, Vernier calliper, Try square
- Finishing tools and techniques
- Adhesives and fastening methods
- Introduction to power tools (demonstration)

Unit 3: Fabrication Processes

- Cutting, shaping, and forming techniques
- Joining methods (adhesive, mechanical)
- Bending and forming processes

- Casting techniques (basic)
- Surface finishing: sanding, polishing, painting

Unit 4: Advanced Model Making Techniques (6 Hours)

- Introduction to rapid prototyping
- Basics of 3D printing
- Laser cutting fundamentals
- CNC machining overview
- Digital vs manual model making

Unit 5: Prototyping and Application

- Translating sketches into physical models
- Iterative prototyping process
- Functional vs aesthetic models
- Case studies in product design
- Final model development project

Course Outcomes (COs)

After completing the course, students will be able to:

- **CO1:** Identify and select appropriate materials for model making
- **CO2:** Demonstrate safe and effective use of tools and equipment
- **CO3:** Apply fabrication techniques to create physical models
- **CO4:** Develop prototypes based on design concepts
- **CO5:** Evaluate material-process combinations for design applications

Mapping of COs with Program Outcomes (POs)

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	2	-	-	-	-	1
CO2	2	-	2	-	3	2	-	2	2	-	-	1
CO3	3	2	3	2	3	2	-	-	2	1	-	1
CO4	3	3	3	2	2	-	1	-	2	2	2	2
CO5	3	3	3	2	2	2	3	-	-			

Recommended Resources

- Model Making for Product Design – Hallgrimsson
- Materials and Design – Ashby & Johnson
- Workshop manuals and fabrication guides

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Course Code & Name	**Instructions Hours per Week**			**Credits**			
3DS105:	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Engineering for Designers							
Duration of Theory Paper: 3Hours	**2**	**0**	**2**	**2**	**0**	**2**	2 + 1P = 3

Course Objectives (COB)

- **COB1:** To provide basic understanding of engineering principles
- **COB2:** To relate engineering concepts with product design applications
- **COB3:** To develop analytical thinking for structural and functional design
- **COB4:** To enable informed material and process decisions

COURSE OF CONTENT

Unit 1: Introduction to Engineering in Design

- Role of engineering in product design
- Basic physical quantities and units
- Overview of forces, energy, and motion
- Engineering thinking for designers
- Safety considerations

Unit 2: Mechanics and Forces

- Types of forces (tension, compression, shear)
- Equilibrium and free body diagrams
- Friction and its applications
- Work, energy, and power
- Simple machines (levers, pulleys, gears – basics)

Unit 3: Materials and Strength

- Mechanical properties of materials (strength, elasticity, toughness)
- Stress and strain concepts
- Material selection for product design
- Failure modes (bending, buckling, fatigue – basic understanding)

Unit 4: Structures and Mechanisms

- Basics of structures (frames, trusses)
- Load distribution and stability

- Introduction to mechanisms (linkages, cams)
- Motion in products

Unit 5: Manufacturing and Engineering Applications

- Overview of manufacturing processes (casting, machining, forming)
- Design for manufacturing (DFM basics)
- Tolerances and fits (introductory)
- Integration of engineering in product development
- Case studies

Course Outcomes (COs)

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

- **CO1:** Understand basic engineering concepts relevant to design
- **CO2:** Apply principles of mechanics in product design
- **CO3:** Analyze forces, motion, and structures
- **CO4:** Select materials and processes based on engineering criteria
- **CO5:** Evaluate design feasibility and functionality

CO–PO Mapping Matrix

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	1	-	-	-	-	1
CO2	3	3	3	2	2	-	-	-	2	1	-	1
CO3	3	3	3	3	2	-	-	-	2	1	-	1
CO4	3	3	3	2	2	2	3	-	-	2	1	2
CO5	3	3	3	3	2	2	2	1	2			

Reference Books

1. Ashby, M. – *Materials Selection in Mechanical Design*
2. Norton, R. – *Design of Machinery*
3. Hibbeler, R.C. – *Engineering Mechanics*
4. Lesko, J. – *Industrial Design Materials and Manufacturing Guide*

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Course Code & Name	**Instructions Hours per Week**			**Credits**			
3DS106:	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Exploratory Design Methods							
Duration of Theory Paper: 3Hours	**2**	**0**	**2**	**2**	**0**	**2**	2 + 1P = 3

Course Objectives (COB)

- **COB1:** To develop creative thinking and exploratory skills
- **COB2:** To introduce design research and ideation methods
- **COB3:** To encourage experimentation and iteration
- **COB4:** To enable user-centered and insight-driven design

COURSE OF CONTENTS

Unit 1: Introduction to Exploratory Design

- Meaning and importance of exploratory design
- Divergent vs convergent thinking
- Design thinking overview
- Creativity and innovation in product design
- Exploration vs problem-solving

Unit 2: Ideation Techniques

- Brainstorming and brain writing
- Mind mapping and SCAMPER
- Analogical thinking and lateral thinking
- Visual thinking and sketch ideation
- Rapid idea generation exercises

Unit 3: Design Research & User Exploration

- Basics of design research
- User observation and contextual inquiry
- Interviews and surveys (introductory)
- Empathy mapping and user personas
- Insight generation

Unit 4: Experimentation and Iteration

- Prototyping for exploration (low fidelity)
- Iterative design process
- Trial-and-error methods
- Feedback and refinement cycles
- Learning from failure

Unit 5: Concept Development and Evaluation (6 Hours)

- Concept synthesis
- Storyboarding and scenario building
- Concept evaluation methods
- Selection criteria and decision making
- Final concept presentation

Course Outcomes (Cos)

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

- **CO1:** Understand exploratory approaches in design *(K2)*
- **CO2:** Apply ideation techniques for concept generation *(K3)*
- **CO3:** Conduct basic design research and user exploration *(K4)*
- **CO4:** Develop and iterate design concepts *(K4)*
- **CO5:** Evaluate and refine design solutions *(K5)*

CO–PO Mapping Matrix

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	1	-	-	-	-	1
CO2	3	3	3	2	2	-	-	-	2	2	-	1
CO3	3	3	3	3	2	-	2	-	2	2	-	1
CO4	3	3	3	3	2	-	2	-	3	3	2	2
CO5	3	3	3	3	2	2	3	1	2	3	2	2

Reference Books

1. Tim Brown – *Change by Design*
2. Don Norman – *The Design of Everyday Things*
3. Vijay Kumar – *101 Design Methods*
4. IDEO – *Human-Centered Design Toolkit*

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Course Code & Name	**Instructions Hours per Week**			**Credits**			
3DS107:	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Lab/ Workshop (Materials and Model Making)	**0**	**0**	**4**	**0**	**0**	**4**	2
Duration of Theory Paper: 3Hours							

Course Objectives (COB)

- **COB1:** To provide hands-on experience with model-making materials
- **COB2:** To develop skills in tool usage and workshop practices
- **COB3:** To understand fabrication techniques and processes
- **COB4:** To enable prototyping and physical realization of design ideas

List of Experiments / Exercises

Exercise 1: Introduction to Tools and Safety

- Familiarization with tools and workshop rules
- Demonstration of safe handling

Exercise 2: Paper and Board Modeling

- Cutting, folding, and joining techniques
- Construction of simple geometric forms

Exercise 3: Wooden Model Fabrication

- Marking, cutting, shaping wood
- Assembly using adhesives

Exercise 4: Foam and Thermocol Modeling

- Shaping using cutters and hot wire
- Surface finishing techniques

Exercise 5: Acrylic/Plastic Model

- Cutting and joining acrylic sheets
- Edge finishing and polishing

Exercise 6: Clay/Plaster Modeling

- Form development using clay
- Mold making and casting (basic)

Exercise 7: Surface Finishing Techniques

- Sanding, priming, painting
- Texture creation

Exercise 8: Final Model Making Project

- Development of a scaled product model
- Application of learned materials and processes

Course Outcomes (COs)

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

- **CO1:** Identify and use appropriate materials *(K2)*
- **CO2:** Demonstrate safe handling of tools and equipment *(K3)*
- **CO3:** Apply fabrication techniques *(K3)*
- **CO4:** Develop physical models and prototypes *(K4)*
- **CO5:** Evaluate model quality and finish *(K5)*

CO–PO Mapping

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	2	-	-	-	-	1
CO2	2	-	2	-	3	2	-	2	2	-	-	1
CO3	3	2	3	2	3	2	-	-	2	1	-	1
CO4	3	3	3	2	2	-	1	-	2	2	2	2
CO5	3	3	3	2	2	2	3	-	-			

Recommended References

- Hallgrimsson – *Prototyping and Model Making*
- Lesko – *Industrial Design Materials and Manufacturing Guide*
- Workshop practice manuals

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Course Code & Name	**Instructions Hours per Week**			**Credits**			
3DS1K08: **Principles of Ethical Design**	**L**	**T**	**P**	**L**	**T**	**P**	**Total**
Duration of Theory Paper: 3Hours	**1**	**1**	**0**	**1**	**1**	**0**	2

Course Objectives (COB)

- **COB1:** To understand ethical principles in design
- **COB2:** To analyze social, cultural, and environmental impacts of design
- **COB3:** To develop responsible and inclusive design practices
- **COB4:** To enable ethical decision-making in design processes

COURSE OF CONTENT

Unit 1: Introduction to Ethics in Design

- Meaning of ethics and moral responsibility
- Ethics in design practice
- Role of designers in society
- Overview of ethical theories (utilitarianism, deontology – basic understanding)

Unit 2: Social and Cultural Responsibility

- Design and social impact
- Cultural sensitivity and diversity
- Inclusive design and accessibility
- Gender, age, and ability considerations
- Case studies

Unit 3: Environmental and Sustainable Design

- Environmental impact of products
- Sustainable design principles
- Life cycle thinking (LCA – basic introduction)
- Materials and sustainability
- Circular design concepts

Unit 4: Ethics in Professional Practice

- Professional ethics and responsibilities
- Intellectual property and plagiarism
- User privacy and data ethics
- Ethical issues in emerging technologies
- Codes of conduct in design

Unit 5: Ethical Decision Making in Design

- Ethical frameworks for decision-making
- Identifying ethical dilemmas
- Balancing business, user, and societal needs
- Ethical evaluation of design solutions
- Final project presentation (ethical analysis)

Course Outcomes (COs)

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

- **CO1:** Understand ethical theories and design responsibility
- **CO2:** Analyze ethical issues in design contexts
- **CO3:** Apply ethical frameworks to design decisions
- **CO4:** Develop socially responsible and inclusive design solutions
- **CO5:** Evaluate the impact of design on society and environment

CO–PO Mapping Matrix

CO / PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	-	-	2	3	-	-	-	1
CO2	2	3	2	2	-	-	3	3	-	2	-	1
CO3	3	3	3	2	1	2	3	3	2	2	1	1
CO4	3	3	3	2	2	2	3	3	3	2	2	2
CO5	3	3	3	3	1	2	3	3	2			

Reference Books

1. Don Norman – *The Design of Everyday Things*
2. Victor Papanek – *Design for the Real World*
3. Mike Monteiro – *Ruined by Design*
4. IDEO – *Human-Centered Design Toolkit*