

**NIRMA UNIVERSITY**

<b>Institute:</b>	<b>INSTITUTE OF DESIGN</b>
<b>Name of Programme:</b>	<b>BACHELOR OF DESIGN</b>
<b>Course Code:</b>	3DD303ME26
<b>Course Title:</b>	<b>Bio-Mimicry</b>
<b>Course Type:</b>	<input type="checkbox"/> Core/ <input type="checkbox"/> Value Added Course/ Departmental Elective/ Institute Elective/ <input type="checkbox"/> University Elective/ <input checked="" type="checkbox"/> <b>Open Elective</b> / <input type="checkbox"/> Any other
<b>Year of introduction:</b>	<b>Academic Year 2026-27</b>

L	T	Practical component				C
		LPW	PW	W	S	
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**Course Learning Outcomes (CLO):**

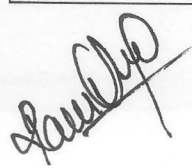
At the end of the course, the student will be able to:

- Analyse principles of bio-mimicry and nature-inspired design to understand how biological systems inform product innovation. BL4
- Apply research methods to study biological systems and natural phenomena. BL3
- Develop bio-inspired product concepts through ideation, form exploration, and functional integration based on extracted natural principles. BL6
- Evaluate and select appropriate materials, production techniques, and printing processes to ensure the technical feasibility and practicality of designs. BL4
- Produce a final bio-mimetic product prototype demonstrating functional relevance, sustainability considerations, and design rationale. BL6

**Content:**

**Total Teaching hours: 120 Hrs**

Units	Content	Teaching hours
<b>Unit 1</b>	<b>Introduction to Bio-Mimicry in Design</b> <ul style="list-style-type: none"> <li>Definition and scope of bio-mimicry</li> <li>Overview of biological systems, flora, fauna, and natural phenomena</li> <li>Functional strategies in nature: structure, movement, efficiency, adaptation</li> <li>Case studies of bio-mimetic products across industries</li> <li>Ethical and sustainability considerations in nature-inspired design</li> </ul>	<b>12 Hrs</b>
<b>Unit 2</b>	<b>Brief Definition, Research and Problem Definition</b> <ul style="list-style-type: none"> <li>Studying flora, fauna, and natural systems</li> <li>Understanding form-function relationships in biology</li> </ul>	<b>24 Hrs</b>



	<ul style="list-style-type: none"> <li>• Extracting principles from biological systems</li> <li>• Translating biological strategies into design parameters</li> <li>• Research synthesis and problem framing</li> </ul>	
<b>Unit 3</b>	<b>Ideation and Product Development</b> <ul style="list-style-type: none"> <li>• Concept generation based on insights from research</li> <li>• Form development, material exploration, and functional integration</li> <li>• Concept evaluation based on feasibility and relevance</li> <li>• Iterative refinement of product concepts</li> <li>• Preliminary prototyping and testing</li> </ul>	<b>36 Hrs</b>
<b>Unit 4</b>	<b>Final Prototype and Design Documentation</b> <ul style="list-style-type: none"> <li>• Development of a final bio-mimetic product prototype</li> <li>• Functional validation and refinement</li> <li>• Design documentation: research narrative, concept evolution, drawings, and models</li> <li>• Final presentation and design communication</li> </ul>	<b>48 Hrs</b>

<b>Self-Study</b>	
<b>Suggested Readings/References</b>	<p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. Benyus, J. M. (2002), <i>Biomimicry: Innovation Inspired by Nature</i>. Harper Perennial, USA</li> <li>2. Vincent, J. F. V., Bogatyreva, O. A., Bogatyrev, N. R., Bowyer, A., &amp; Pahl, A. K. (2006), <i>Biomimetics: Its Practice and Theory</i>. Journal of the Royal Society Interface</li> <li>3. Pawlyn, M. (2011), <i>Biomimicry in Architecture</i>. RIBA Publishing, London</li> <li>4. Vincent, J. (2012), <i>Structural Biomaterials</i>. Princeton University Press</li> </ol> <p><b>Online Resources</b></p> <ol style="list-style-type: none"> <li>1. Biomimicry Institute. <i>AskNature Database</i>. Biomimicry Institute, USA, 2021.</li> <li>2. Biomimicry Institute. <i>Biomimicry Design Lens</i>. Biomimicry Institute, USA, 2020.</li> <li>3. TED Conferences. <i>Talks on Biomimicry and Nature-Inspired Design</i>. TED, USA.</li> <li>4. National Geographic Society. <i>Nature and Science Resources</i>. National Geographic.</li> </ol>

