

**NIRMA UNIVERSITY**

<b>Institute:</b>	<b>INSTITUTE OF DESIGN</b>
<b>Name of Programme:</b>	<b>BACHELOR OF DESIGN</b>
<b>Course Code:</b>	3DD103MC26
<b>Course Title:</b>	<b>Advanced CAD Modelling and Applications</b>
<b>Course Type:</b>	<input checked="" type="checkbox"/> Core/ <input type="checkbox"/> Value Added Course/ <input type="checkbox"/> Departmental Elective/ Institute Elective/ University Elective/ Open Elective 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:

1. Create complex Solids and surface-based CAD models using advanced surface modelling techniques **BL6**
2. Apply Surface and Solid modelling strategies to develop accurate, editable, and functionally detailed CAD models **BL3**
3. Evaluate and prepare CAD models for manufacturing processes such as CNC machining, mold making, and additive manufacturing by incorporating process-specific constraints and production requirements. **BL5**

**Content:**

**Total Teaching hours: 120 Hrs**

Units	Content	Teaching hours
<b>Unit 1</b>	<b>Advanced Surface Modelling (NURBS):</b> <ul style="list-style-type: none"> <li>• Role of surface modelling in product and interaction design</li> <li>• NURBS-based surface geometry and control point logic</li> <li>• Surface creation techniques: lofts, sweeps, boundary surfaces, and patches</li> <li>• Surface refinement for aesthetic quality and ergonomic intent</li> <li>• Converting conceptual forms into controlled surface models</li> </ul>	<b>60 Hrs</b>

<b>Unit 2</b>	<b>Advanced Solid Modelling and Parametric Design:</b> <ul style="list-style-type: none"> <li>• Solid modelling strategies</li> <li>• Boolean operations and complex solid construction</li> <li>• Multi-body modelling and assembly preparation</li> <li>• Tolerance awareness and functional detailing</li> <li>• Design iteration through parametric control</li> </ul>	<b>42 Hrs</b>
<b>Unit 3</b>	<b>CAD for Manufacturing Applications:</b> <ul style="list-style-type: none"> <li>• CAD considerations for CNC machining</li> <li>• CAD considerations for Mould Design</li> <li>• CAD considerations for Sheet Metal</li> <li>• CAD considerations for Weldment:</li> <li>• CAD considerations for additive manufacturing</li> <li>• File formats and data exchange for manufacturing (STEP, IGES, STL)</li> </ul>	<b>18 Hrs</b>

<b>Self-Study</b>	
<b>Suggested Readings/References</b>	<p><b>Books</b></p> <ol style="list-style-type: none"> <li>1. Zeid, I., &amp; Sivasubramanian (2014), R. <i>CAD/CAM Theory and Practice</i>. McGraw-Hill Education, New Delhi</li> <li>2. Vaughan (2012), W. <i>Digital Modeling</i>. New Riders Publishing, USA</li> <li>3. Boothroyd, G., Dewhurst, P., &amp; Knight, W (2010). <i>Product Design for Manufacture and Assembly</i>. CRC Press, USA</li> <li>4. Thompson, R (2007). <i>Manufacturing Processes for Design Professionals</i>. Thames &amp; Hudson, London</li> <li>5. Gibson, I., Rosen, D., &amp; Stucker (2015), B. <i>Additive Manufacturing Technologies</i>. Springer, New York</li> <li>6. Planchar, D (2018). <i>Engineering Design with SolidWorks</i>. SDC Publications, USA</li> <li>7. Gibson, I (2017). <i>Design for Additive Manufacturing: Concepts and Constraints</i>. Springer Briefs in Manufacturing and Surface Engineering</li> <li>8. Kalpakjian, S., &amp; Schmid (2014), S. <i>Manufacturing Engineering and Technology</i>. Pearson Education</li> </ol> <p><b>Online Resources</b></p> <ol style="list-style-type: none"> <li>1. Robert McNeel &amp; Associates (2020). <i>Rhino 3D User Guide and Official Tutorials</i>. Robert McNeel &amp; Associates, USA</li> <li>2. Dassault Systèmes (2021). <i>SolidWorks User Manuals and Built-in Tutorials</i>. Dassault Systèmes, France</li> </ol>

w.e.f. Academic year 2026 and onwards

Key: L= Lecture, T = Tutorial, P= Practical, C= Credit