

INDIAN INSTITUTE OF INFORMATION TECHNOLOGY DESIGN AND MANUFACTURING
(IIITDM) KANCHEEPURAM

Course Title	Mathematics for Designers	Course No				
Specialization	Integrated Product Design	Structure (LTPC)	2	1	0	3
Offered for	Master of Design (Semester 4)	Status	Core		Elective X	
Prepared by	Dr Nachiketa Mishra					
Prerequisite	Basic mathematics	To take effect from	2021 Batch			
Course Objectives	To develop an understanding of mathematical principles behind algorithms for innovative design by bringing together mathematics, computer science, engineering design and art					
Course Outcomes	<ul style="list-style-type: none"> • Understand mathematical logic behind structures; • Ability to develop mathematical models for generative art 					
Contents of the course (With approximate break up of hours)	<p>Module 1: Origami and paper folding (9 hrs)</p> <ul style="list-style-type: none"> • History of Origami, • Physical and geometric properties of paper and folding, • Special types of origami: pureland, box-pleating, tiling, circle packing <p>Module 2: Geometry and mathematical design (15 hrs)</p> <ul style="list-style-type: none"> • Basic on fractal geometry and dimensions. • Fractal concepts applied to design • Julia set, Mandelbrot set • Phi, golden ratio and golden angle in product design, • Polyhedra and platonic solids. <p>Module 3: Geometric folding algorithms (18 hrs)</p> <ul style="list-style-type: none"> • Upper and lower bounds • Planner linkage mechanism • Rigid frameworks • Reconfiguration of chains • Locked chains <p>Evaluation: 70% assignments/activities + 30% End Semester</p>					
Texts & References	<ol style="list-style-type: none"> 1. Bovill, Carl (1996), Fractal Geometry in Architecture and Design, Boston: Birkhäuser, ISBN:9781461269182 2. Demaine, Erik, and Joseph O'Rourke (2007), Geometric Folding Algorithms: Linkages, Origami, Polyhedra. Cambridge University Press, ISBN:9780521857574 3. George Stiny (2008), Shape – Talking about seeing and doing, MIT Press, ISBN:9780262693677 4. Lang, Robert (2011), Origami Design Secrets: Mathematical Methods for an Ancient Art, CRC Press, ISBN:9781568814360 					