Design Paradigm: Source Of Innovation & Invention - Web course

NPTEL

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Engineering Design

Coordinators:

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COURSE OUTLINE

'DESIGN PARADIGM: SOURCE OF INNOVATION & INVENTION'

The proposed course would like to address the followings- What is ***Design Paradigm***? How is it related to design education? Does Design Paradigm help us to think differently? By studying design paradigm does it make you a better designer? Does it make you more innovative?
The topic of paradigm in design is directly or indirectly related to design activities. While trying to understand 'paradigm' the course would try to focus on its relationship to design, which may lead to searching for paradigm based innovative ideas.

Introduction to Design Paradigm; Recognizing Design Paradigm; Paradigm as Metaphor; Design & Natural Phenomenon- Biomimicry; The Human Body; Where Does Form Come From? Design, Paradigm & Science of Design; Natural Development in Traditional Design; Simple Shape Paradigm- Basic Geometrics; The Platonic Solids; Paradigm in Nature

Ball, Sheet, Tube, etc. Concept of Enclosure; Bending & Flexing; Bigger & Smaller; Complex Paradigm; Objects with in Objects; Multi-function Objects

COURSE DETAIL

Module No.	Title	Issues	No. of lectures
01.	**Introduction to Design Paradigm**	What is Design Paradigm? ; Recognizing Paradigm; Paradigm & Metaphors; Paradigm & Design Relationship	**03**
02.	**Design & Natural Phenomenon**	Paradigm in Nature; About Biomimicry	**02-05**
03.	**Human Body**	Paradigm in Human Body	**01-06**
04.	**Where Does Form Come From?**	'Form Follows Function'	**01-07**
05.	**Design, Paradigm & Science of Design**	A comparison between the modern design and a brief historical look at the traditional; not wholly conscious ways of designing and developing artifacts	**02-09**
06.	**Natural**	Man's adoption of changing environment,	**02-11**

	Development in Traditional Design	rigidity in traditional design	
07.	**Design-Nature Relationship**	Wealth of nature's design; modular design	**02-13**
08.	**Simple Shape Paradigm**	Basic Geometrics; Platonic Solids (Five Simple Solids); Simple applications in Packaging Design	**03-16**
09.	**Paradigm in Nature**	Simple Paradigms- Ball, Disc, Tube, Coil, Helicoids, Spiral, Spoon, Cup, Jar, Bottle, Bubble, Blister, Skin, etc. Möbius Strip, Wrap, Pipe, Bag,	**04-20**
10.	**Bending & Flexing**	Sapling, Hinges, Elbow, Ball & Socket, Gooseneck, Nitinol	**03-23**
11.	**Bigger & Smaller**	Growth, Expansion & Contraction, Swelling & Squashing, Spring, Arms & Legs, Wing, Scissors, Screw, Flower, etc.	**04-27**
12.	**Joining**	Zipper, Sewing, Wielding, Ball & Socket, Universal Joints, Knots, Bridge, etc.	**03-30**
13.	**Attaching**	Glue, Adhesive Tape, Clips & Clamps, Magnet	**02-32**
14.	**Passages**	Pipe, Bottleneck, Wire, Filter, Strainer, Canal, etc.	**02-34**
15.	**Complex Paradigms**	Combination of multiple simple paradigm forming complex paradigms- Nested Spoon, etc.	**02-36**
16.	**Objects within Objects**	Peas, Egg, Coconut, Pregnant Woman, Oyster, etc.	**02-38**
17.	**Application of Paradigm**	Using Paradigm for Product Design	**02-40**
Total number of lectures			**40**

References:

- Bailey, Jill. **Animal Life: Form and Function in the Animal Kingdom,** NY: Oxford University Press, 1994
- Beck, Benjamin B. **Animal Tool Behavior: The Use and Manufacture of Tools by Animals**, New York: Garland, 1980
- Bueciarelli, Louis L. **Designing Engineers**, Cambridge, MA: MIT Press 1994

- Fuller, R. Bucminster. **Synergetics: Explorations in the Geometry of Thinking**, New York: Macmillan Pub. 1975,'82
- Fuller, R. Buckminster. **Inventions: The Patented Works of R. Buckminster Fuller**, New York: St. Martin's Press, 1983
- Hargroves, K. D. & Smith, M. H. (2006). Innovation inspired by nature Biomimicry. Ecos, (129)
- Roukes, Nicholas. **Design Synecties: Stimulating Creativity in Design**, Worcester, MA: Davis Pub. 1988
- Rowe, Peter G. **Design Thinking**, Cambridge, MA: MIT Press 1987
- Thompson, D'Arcy W. **On Growth and Form**. Dover 1992 reprint of 1942 2nd ed. (1st ed., 1917)
- Wake, Warren K., **Design Paradigms A Source for Creative Visualization**, New York: John Wiley & Sons, 2000