

Design Courses for B.Tech. Students

The two courses are the foundational courses in design for B. Tech. students. These courses will introduce design to undergraduate students and help them to apply their learnings in their academic and non-academic projects. The following abbreviation is used in the syllabus:

L: Lecture

T: Tutorial

P: Laboratory

S: Studio

CH: Contact Hours

CR: Credit

Course Number: DD - 302	L	T	P	S	CH	Credits
Course Name: Design Methods	1	0	0	2	3	3

Course Objective:

The course will introduce various design methods adopted by researchers, designers, and engineers in academics and industries.

Course Outcomes/Learnings

- Students will learn about various design methods and how to apply them.
- Learning about various techniques involved in the design process.
- Use of design tools for creative problem-solving.

Syllabus:

1. Developments in design methods

History of design methods, Introduction to various design methods by: Alexander, Banathy, Nigel Cross, IDEO, Double Diamond by UK Design Council.

[Assignment]

2. Detail study of the design process

Three stages of a design method:

- Divergence (Stating objectives, literature searching, interviewing, questionnaires, investigating user behavior)
- Transformation (Brainstorming, synectics, removing mental blocks, morphological charts, interaction matrix, AIDA-Analysis of Interconnected Decision Areas)
- Convergence (checklists, selecting criteria, ranking, and weighting)

Application of design tools and different techniques for creative problem solving e.g. card-based tools, creative wheels, SWOT Analysis, fishbone diagram, etc.

[Assignment]

3. Nature-Inspired Design

Introduction to the methods and approaches to take inspiration from nature for the development of tangible and intangible products.

- Approach 1 (Top-down process, Problem-driven biologically inspired design process, Biomimetic by analogy, Challenge to biology)
- Approach 2 (Bottom-up process, Solution-driven biologically inspired design process, Biomimetic by induction, Biology to design)

Case studies on nature-inspired products.

[Assignment]

4. Product development process: from concept to final product

A brief introduction to six phases of the product development process: Planning, Concept development, System-level design, Detail design, Testing and Refinement, Production ramp-up.

[Assignment]

Text Books:

- John Chris Jones.: Design Methods – Seeds of Human Futures, Wiley & sons, 1962
- Ulrich Karl T, Eppinger Steven D.: Product Design and Development, Tata McGraw-Hill, 2004.

Reference Books:

- Bryan Lawson.: How Designer's Think: the design process demystified, Architectural Press, 2005
- James Garra.: Design and Technology, Cambridge, 1995

Case Studies:

- Industrial design case studies: Grass root innovation, Dipbahan, Cane and Bamboo Crafts etc.
- Design projects from various design schools.

Approach:

- Class lectures and discussion on various design methods.
- Case study presentations.
- Individual and group assignments.

Evaluation Criteria:

- Understanding of the subject and effectiveness of applying methods.
- Active participation in class discussions.
- Performance in individual assignments and group assignments.
- Final submission of classwork.