

NPTEL : NOC:Innovation by Design (Engineering Design)

Co-ordinators : Dr. B.K. Chakravarthy

Lecture 1 - The Seven Concerns

Lecture 2 - Design Thinking and Collaboration

Lecture 3 - Challenges to Innovation

Lecture 4 - Understanding Users

Lecture 5 - Arriving at Design Insights

Lecture 6 - Prototyping for User Feedback

Lecture 7 - 1st C The Cause

Lecture 8 - Crossing the First Pitfall

Lecture 9 - Trial and Error

Lecture 10 - User Feedback for Development

Lecture 11 - New users, new needs to meet

Lecture 12 - Knowing the Context

Lecture 13 - 2nd C The Context

Lecture 14 - The Basic Need

Lecture 15 - Ingenious Attempts

Lecture 16 - Further Insights

Lecture 17 - The Working Rig

Lecture 18 - Concepts generation

Lecture 19 - Experiencing the Product

Lecture 20 - Refinements

Lecture 21 - 3rd C - The Comprehension

Lecture 22 - Understanding Constraints

Lecture 23 - Positioning the Product

Lecture 24 - Exploring Possibilities

Lecture 25 - More Experiments

Lecture 26 - Understanding the Technology

Lecture 27 - At the 2nd Valley of Death

Lecture 28 - Finishing Touches

Lecture 29 - The Check

Lecture 30 - The Cause

Lecture 31 - The Product, the Users and the Context

Lecture 32 - The Prototyping

Lecture 33 - User needs

Lecture 34 - The Crucial Step Missed

Lecture 35 - 5th C The Conception

Lecture 36 - Synchronic Studies

Lecture 37 - One product, many problems

Lecture 38 - Concept Clusters

Lecture 39 - From idea to product

Lecture 40 - Prototyping

Lecture 41 - Materials and Technologies

Lecture 42 - Collaborative Efforts

Lecture 43 - 6th C - The Crafting

Lecture 44 - Recap

Lecture 45 - The Manufacturing Challenge

Lecture 46 - The User Feedback

Lecture 47 - The Iterative Process

Lecture 48 - 7th C - The Connection

Lecture 49 - The Seed for Innovation

Lecture 50 - Pinnacle for Innovation

Lecture 51 - The Innovation Timeline

Lecture 52 - The Innovation Champions

Lecture 53 - The Innovation Domains

Lecture 54 - The Innovation Templates

Lecture 55 - The Serial Innovation

NPTEL : NOC:Understanding Design (Engineering Design)

Co-ordinators : Dr. B.K. Chakravarthy

- Lecture 1 - An Introduction to Design
- Lecture 2 - The many notions of design
- Lecture 3 - Design as a process and a product
- Lecture 4 - The evolution of design
- Lecture 5 - Design engages with many disciplines
- Lecture 6 - Design is concerned with the user
- Lecture 7 - Good design, bad design
- Lecture 8 - Users and Contexts
- Lecture 9 - Multiple users, differing contexts
- Lecture 10 - Understanding user experience
- Lecture 11 - Design for a meaningful impact
- Lecture 12 - Design and Society
- Lecture 13 - Community and Collaboration
- Lecture 14 - Understanding Contexts
- Lecture 15 - Knowledge and Access
- Lecture 16 - Meeting Needs: Necessity or Luxury?
- Lecture 17 - Function, Context and Consequences
- Lecture 18 - Design and Sustainability
- Lecture 19 - The cost of looking the other way
- Lecture 20 - Sustainability practices in daily life
- Lecture 21 - The perspective of engineering
- Lecture 22 - Understanding embodied energy
- Lecture 23 - The user's role in sustainability
- Lecture 24 - Framing the world's future
- Lecture 25 - Design and industry
- Lecture 26 - Understanding varied user needs
- Lecture 27 - Success through new materials and manufacturing
- Lecture 28 - Pushing the boundaries of mass production
- Lecture 29 - A Classic chair for all times
- Lecture 30 - Breaking familiar assumptions
- Lecture 31 - Design and Collaboration

Lecture 32 - Team work

Lecture 33 - Collaborating with unlikely partners

Lecture 34 - Principles of collaboration

Lecture 35 - Design thinking

Lecture 36 - Feedback and assessment

Lecture 37 - Innovation by Design

Lecture 38 - Facilitating the reach of a traditional craft

Lecture 39 - Pitfalls of innovation

Lecture 40 - The seven concerns of innovation

Lecture 41 - From a concern to a palki

Lecture 42 - A little design goes a long way

NPTEL : Ergonomics for beginners: Industrial design perspective (Engineering Design)

Co-ordinators : Prof. Debkumar Chakrabarti

- Lecture 1 - Introduction
- Lecture 2 - Design today - human aid to lifestyle
- Lecture 3 - Journey, fitting task to man
- Lecture 4 - Domain, philosophy and objective
- Lecture 5 - Mutual task comfort: two way dialogue, communication model
- Lecture 6 - Ergonomics/ human factors fundamentals
- Lecture 7 - Physiology, (work physiology) and stress
- Lecture 8 - Human body - structure and function, anthropometrics
- Lecture 9 - Anthropometry: body growth and somatotypes
- Lecture 10 - Static and dynamic anthropometry: standing
- Lecture 11 - Anthropometry landmark: sitting postures
- Lecture 12 - Anthropometry : squatting and cross-legged postures
- Lecture 13 - Measuring techniques
- Lecture 14 - Statistical treatment of data and
- Lecture 15 - Human body-structure and function
- Lecture 16 - Posture and job relation
- Lecture 17 - Posture and body supportive devices
- Lecture 18 - Chair characteristics
- Lecture 19 - Vertical work surface
- Lecture 20 - Horizontal work surface
- Lecture 21 - Movement
- Lecture 22 - Work Counter
- Lecture 23 - Communication and cognitive issues
- Lecture 24 - Psycho-social behaviour aspects,
- Lecture 25 - Information processing and perception
- Lecture 26 - Cognitive aspects and mental workload
- Lecture 27 - Human error and risk perception
- Lecture 28 - Visual performance
- Lecture 29 - Visual displays
- Lecture 30 - Environmental factors influencing
- Lecture 31 - Ergonomics design methodology

Lecture 32 - Ergonomics criteria/check

Lecture 33 - Design process involving

Lecture 34 - Some checklist for task easiness

Lecture 35 - Occupational safety and stress at workplace

Lecture 36 - Workstation design

Lecture 37 - Furniture support

Lecture 38 - Vertical arm reach and relevant

Lecture 39 - Humanising design :Design and human compatibility, comfort and adaptability aspects

Lecture 40 - Scope for exploration

NPTEL : NOC: System Design for Sustainability (Engineering Design)

Co-ordinators : Prof. Sharmistha Banerjee

Lecture 1 - Sustainability and Sustainable Development - Understanding Un-sustainability and need for Sustainability

Lecture 2 - Sustainability and Sustainable Development - Definitions

Lecture 3 - Sustainability and Sustainable Development - Pathway

Lecture 4 - Systems Approach to Design

Lecture 5 - Evolution of sustainability within Design

Lecture 6 - Diverse Approaches to Design for Sustainability - Part A

Lecture 7 - Diverse Approaches to Design for Sustainability - Part B

Lecture 8 - Relationship between approaches to Design for Sustainability and the application context

Lecture 9 - Product Life Cycle Design - Methods and Strategies

Lecture 10 - Product Life Cycle Assessment - Part A

Lecture 11 - Product Life Cycle Assessment - Part B

Lecture 12 - Life Cycle Assessment using Software

Lecture 13 - Design for Product Life Cycle

Lecture 14 - Product-Service System Design - Definition and Types

Lecture 15 - Sustainable Product-Service System Design - Definition and Examples

Lecture 16 - Sustainable Product-Service System Design - Examples

Lecture 17 - Khadi Movement as a precursor to PSS thinking

Lecture 18 - Sustainable Product-Service System Design - Transition Paths, Strategy and Challenges

Lecture 19 - Sustainable Product-Service System Design - Methods and Tools - Part A

Lecture 20 - Sustainable Product-Service System Design - Methods and Tools - Part B

Lecture 21 - Sustainable Product-Service System Design - Methods and Tools - Part C

Lecture 22 - Sustainable Product-Service System Design - Methods and Tools - Part D

Lecture 23 - Sustainable Product-Service System Design - Methods and Tools - Part E

Lecture 24 - Sustainable Product-Service System Design - Methods and Tools - Part F

Lecture 25 - Sustainable Product-Service System Design - Methods and Tools - Part G

Lecture 26 - Sustainable Product-Service System Design - Methods and Tools (Summary)

Lecture 27 - Sufficiency Economy Philosophy applied to Sustainable PSS Thinking

Lecture 28 - LCA of PSS

Lecture 29 - Sustainable Product-Service System Design Applied to Distributed Economy

Lecture 30 - Other Design for Sustainability Tools and approaches - Architecture

Lecture 31 - Other Design for Sustainability Tools and approaches - Agriculture

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[Lecture 32 - Other Design for Sustainability Tools and approaches - Cities and communities](#)

[Lecture 33 - Other Design for Sustainability Tools and approaches - Carbon Footprint](#)

[Lecture 34 - Co-design Session](#)

[Lecture 35 - Design for Sustainability - Engineering Design Criteria and Guidelines](#)

[Lecture 36 - Design for Sustainability - Engineering Design Criteria and Guidelines \(ICS Toolkit\)](#)

[Lecture 37 - Design for Sustainability - Concluding Lecture - Part A](#)

[Lecture 38 - Design for Sustainability - Concluding Lecture - Part B](#)

NPTEL : NOC:Product Design and Innovation (Engineering Design)

Co-ordinators : Prof. Debayan Dhar, Prof.Swati Pal, Prof. Supradip Das

Lecture 1 - Introduction to Innovation

Lecture 2 - Design Inspired Innovation and User Innovation

Lecture 3 - Product Design - Part I

Lecture 4 - Product Design - Part II

Lecture 5 - Product Design - Part III

Lecture 6 - Introduction to User study and Problem and need Identification

Lecture 7 - Contextual Enquiry

Lecture 8 - Physical model

Lecture 9 - Importance and Overview of Human Factors/Ergonomics in Product Design

Lecture 10 - Physical Ergonomics Principles and Issues (Part 1) - Anthropometry

Lecture 11 - Physical Ergonomics Principles and Issues (Part 2) - Biomechanics

Lecture 12 - Cognitive and Emotional aspects of Human Factors with respect to Product Design and Innovation

Lecture 13 - Creative Techniques and tools for concept generation, concept evaluation

Lecture 14 - Tools and Techniques for Prototyping

Lecture 15 - Evaluation Tools and Techniques for User-Product Interaction

NPTEL : NOC:Interaction Design (Engineering Design)

Co-ordinators : Prof.Abhishek Shrivastava

Lecture 1 - Basic Definitions and Concepts in Interaction Design

Lecture 2 - Relevance of goals in Interaction Design

Lecture 3 - System model, mental model, and representation model

Lecture 4 - Interaction Models and Interaction Paradigms

Lecture 5 - Interaction paradigm

Lecture 6 - Overview of Goal Directed Design Process

Lecture 7 - The Research phase in Goal Directed Design Process - Part 1

Lecture 8 - The Research phase in Goal Directed Design Process - Part 2

Lecture 9 - The Research phase in Goal Directed Design Process - Part 3

Lecture 10 - The Modeling phase in Goal Directed Design Process

Lecture 11 - The Requirement definition phase in Goal Directed Design Process - Part 1

Lecture 12 - The Requirement definition phase in Goal Directed Design Process - Part 2

Lecture 13 - The Framework definition and refinement phase in Goal Directed Design Process - Interaction framework

Lecture 14 - The Framework definition and refinement phase in Goal Directed Design Process - Visual design and industrial design framework

Lecture 15 - Design evaluation and testing

NPTEL : NOC:Ergonomics in Automotive Design (Engineering Design)

Co-ordinators : Dr. Sougata Karmakar

Lecture 1 - Introduction to Automotive Ergonomics

Lecture 2 - Driver Information Acquisition and Processing

Lecture 3 - Anthropometric and Biomechanical Data in Automotive Design

Lecture 4 - Occupant Packaging : Basics and Details

Lecture 5 - Principles of Control and Display Design

Lecture 6 - Usability evaluation of In-vehicle control and displays

Lecture 7 - Human Fields of View and Driver's Fields of View

Lecture 8 - Vehicle Entry and Exit : Basics and Details

Lecture 9 - Driver Distraction and Driving Performance Measurement

Lecture 10 - Driver Workload Measurement

Lecture 11 - Virtual Ergonomics Evaluation Technique and its application in Automotive Design

Lecture 12 - Automotive Craftsmanship

NPTEL : NOC:Ergonomics Workplace Analysis (Engineering Design)

Co-ordinators : Prof. Urmi R. Salve

Lecture 1 - Introduction to Ergonomics Workplace Assessment - I

Lecture 2 - Introduction to Ergonomics Workplace Assessment - II

Lecture 3 - Task Analysis

Lecture 4 - Physiological Fundamentals of Workplace Evaluation

Lecture 5 - Biomechanics in Workplace Evaluation

Lecture 6 - Assessment of Physical Job Demand

Lecture 7 - Assessment of Physical and Cognitive Work with Psychophysiological Methods

Lecture 8 - Assessment of Physical and Cognitive Work with Psychophysiological Methods

Lecture 9 - Assessment of Mental Workload

Lecture 10 - Neuroergonomics in Work Evaluation

Lecture 11 - Psychosocial Aspect of Workplace Analysis

Lecture 12 - Assessment of Thermal Environment

Lecture 13 - Assessment of Visual Environment

Lecture 14 - Analysis of Auditory Environment and Noise Pollution

NPTEL : Principles of Engineering System Design (Engineering Design)

Co-ordinators : Dr. T. Asokan

- Lecture 1 - Introduction to system Design
- Lecture 2 - Engineering systems Classification & examples
- Lecture 3 - Modern System design processes
- Lecture 4 - Six functions of design process
- Lecture 5 - Tools for enabling creative development
- Lecture 6 - Team Development : Group Exercises
- Lecture 7 - System Requirement Analysis
- Lecture 8 - Originating Requirements: Example System Engineering software -CORE
- Lecture 9 - Functional Architecture Development
- Lecture 10 - Functional Decomposition
- Lecture 11 - Functional Decomposition : Examples
- Lecture 12 - Physical Architecture Development
- Lecture 13 - Implementing Fault Tolerance in Physical Architecture
- Lecture 14 - Operational Architecture Development - Part I
- Lecture 15 - Operational Architecture Development - Part II
- Lecture 16 - Interface architecture Development
- Lecture 17 - Interface standards and Design process
- Lecture 18 - Integration and qualification
- Lecture 19 - Qualification planning and methods
- Lecture 20 - System Design Example: Autolink system
- Lecture 21 - System Design Examples
- Lecture 22 - System Design Examples (Continued...)
- Lecture 23 - Graphical Modelling Techniques
- Lecture 24 - Process modeling
- Lecture 25 - Behavior modeling
- Lecture 26 - Graphical Modelling Techniques (Continued...)
- Lecture 27 - System modeling and simulation
- Lecture 28 - Bondgraph modeling of Dyanamic systems
- Lecture 29 - Decision making in System Design
- Lecture 30 - Decision making in System Design (Continued...)

NPTEL : Vehicle Dynamics (Engineering Design)

Co-ordinators : Dr. R. Krishnakumar

- Lecture 1 - Introduction to Vehicle Dynamics
- Lecture 2 - Longitudinal Dynamics
- Lecture 3 - Vehicle Load Distribution - Acceleration and Braking
- Lecture 4 - Brake Force Distribution, Braking Efficiency and Braking Distance
- Lecture 5 - Tractor - Semi Trailer
- Lecture 6 - Tire Mechanics - An Introduction
- Lecture 7 - Mechanical Properties of Rubber
- Lecture 8 - Slip, Grip and Rolling Resistance
- Lecture 9 - Tire Construction and Force Development
- Lecture 10 - Contact Patch and Contact Pressure Distribution
- Lecture 11 - Tire Brush Model
- Lecture 12 - Lateral Force Generation
- Lecture 13 - Ply Steer and Conicity - Part 1
- Lecture 14 - Ply Steer and Conicity - Part 2
- Lecture 15 - Tire Models - Magic Formula
- Lecture 16 - Classification of Tyre Models and Combined Slip
- Lecture 17 - Lateral Dynamics - An Introduction
- Lecture 18 - Lateral Dynamics - Bicycle Model
- Lecture 19 - Lateral Dynamics - Stability and Steering Conditions
- Lecture 20 - Understeer Gradient and State Space Approach
- Lecture 21 - Handling Response of a Vehicle
- Lecture 22 - Mimuro Plot for Lateral Transient Response - Part 1
- Lecture 23 - Mimuro Plot for Lateral Transient Response - Part 2
- Lecture 24 - Parameters affecting vehicle handling characteristics
- Lecture 25 - Subjective and Objective Evaluation of Vehicle Handling - Part 1
- Lecture 26 - Subjective and Objective Evaluation of Vehicle Handling - Part 2
- Lecture 27 - Subjective and Objective Evaluation of Vehicle Handling and Rollover P
- Lecture 28 - Rollover Prevention (Continued...) and Vertical Dynamics
- Lecture 29 - Vertical Dynamics - An Introduction
- Lecture 30 - Vertical Dynamics - Quarter Car Model
- Lecture 31 - Noise, Vibration and Harshness - Random Processes

[Lecture 32 - Random Process and Conclusion \(Continued...\)](#)

NPTEL : NOC:Control Systems (Engineering Design)

Co-ordinators : Prof. C.S.Shankar Ram

- Lecture 1 - Introduction to Control Systems - Part 1
- Lecture 2 - Introduction to Control Systems - Part 2
- Lecture 3 - Overview of Feedback Control Systems - Part 1
- Lecture 4 - Overview of Feedback Control Systems - Part 2
- Lecture 5 - Mathematical Preliminaries - Part 1
- Lecture 6 - Mathematical Preliminaries - Part 2
- Lecture 7 - Transfer Function - Part 1
- Lecture 8 - Transfer Function - Part 2
- Lecture 9 - System Response - Part 1
- Lecture 10 - System Response - Part 2
- Lecture 11 - BIBO Stability - Part 1
- Lecture 12 - BIBO Stability - Part 2
- Lecture 13 - Effect of Zeros - Part 1
- Lecture 14 - Effect of Zeros - Part 2
- Lecture 15 - Closed Loop System - Part 1
- Lecture 16 - Closed Loop System - Part 2
- Lecture 17 - First Order Systems - Part 1
- Lecture 18 - First Order Systems - Part 2
- Lecture 19 - Second Order Systems - Part 1
- Lecture 20 - Second Order Systems - Part 2
- Lecture 21 - Controllers - Part 1
- Lecture 22 - Controllers - Part 2
- Lecture 23 - Closed Loop Control - Part 1
- Lecture 24 - Closed Loop Control - Part 2
- Lecture 25 - Routh's Stability Criterion - Part 1
- Lecture 26 - Routh's Stability Criterion - Part 2
- Lecture 27 - Special Cases of Routh's Stability Criterion - Part 1
- Lecture 28 - Special Cases of Routh's Stability Criterion - Part 2
- Lecture 29 - Performance Specifications - Part 1
- Lecture 30 - Performance Specifications - Part 2
- Lecture 31 - Steady State Error Analysis - Part 1

Lecture 32 - Steady State Error Analysis - Part 2

Lecture 33 - Root Locus 1 - Part 1

Lecture 34 - Root Locus 1 - Part 2

Lecture 35 - Root Locus 2 - Part 1

Lecture 36 - Root Locus 2 - Part 2

Lecture 37 - Root Locus 3 - Part 1

Lecture 38 - Root Locus 3 - Part 2

Lecture 39 - Root Locus 4 - Part 1

Lecture 40 - Root Locus 4 - Part 2

Lecture 41 - Case Study - Modelling - Part 1

Lecture 42 - Case Study - Modelling - Part 2

Lecture 43 - Case Study - Control Design - Part 1

Lecture 44 - Case Study - Control Design - Part 2

Lecture 45 - State Space Representation - Part 1

Lecture 46 - State Space Representation - Part 2

Lecture 47 - Frequency Response - Part 1

Lecture 48 - Frequency Response - Part 2

Lecture 49 - Bode Plot 1 - Part 1

Lecture 50 - Bode Plot 1 - Part 2

Lecture 51 - Bode Plot 2 - Part 1

Lecture 52 - Bode Plot 2 - Part 2

Lecture 53 - Bode Plot 3 - Part 1

Lecture 54 - Bode Plot 3 - Part 2

Lecture 55 - Bode Plot 4 - Part 1

Lecture 56 - Bode Plot 4 - Part 2

Lecture 57 - Nyquist Plot 1 - Part 1

Lecture 58 - Nyquist Plot 1 - Part 2

Lecture 59 - Nyquist Plot 2 - Part 1

Lecture 60 - Nyquist Plot 2 - Part 2

Lecture 61 - Nyquist Stability Criterion - Part 1

Lecture 62 - Nyquist Stability Criterion - Part 2

Lecture 63 - Relative Stability 1 - Part 1

Lecture 64 - Relative Stability 1 - Part 2

[Lecture 65 - Relative Stability 2 - Part 1](#)

[Lecture 66 - Relative Stability 2 - Part 2](#)

[Lecture 67 - Lead Compensation - Part 1](#)

[Lecture 68 - Lead Compensation - Part 2](#)

[Lecture 69 - Lead Compensator Design - Part 1](#)

[Lecture 70 - Lead Compensator Design - Part 2](#)

[Lecture 71 - Lag and Lag-Lead Compensation - Part 1](#)

[Lecture 72 - Lag and Lag-Lead Compensation - Part 2](#)