

# Principles of Engineering System Design

## - Video course

### COURSE OUTLINE

Systems Engineering is a top-down, life-cycle approach to the design, development, and deployment of large-scale engineering systems, processes, or operations to meet the effective needs of users and stakeholders in a cost-effective, high-quality way.

Systems Engineering typically involves an interdisciplinary approach and means to enable the realization of successful engineering systems.

### Course objective:

The objective of this course is to introduce the concepts of system engineering to the students and to utilize these concepts in the design of complex engineering systems. The course will cover the broad areas of system engineering, functions of system engineering, and design of engineering systems.

It focuses on defining customer needs and required functionality early in the development cycle, documenting the requirements, then proceeding with design synthesis and system validation while considering the complete problem.

Modelling of complex engineering systems and failure analysis of systems also will be covered along with case studies.

### COURSE DETAIL

Topics	No. of Hours
Introduction to Systems Engineering: Case studies from Industry.	2
System life cycle, System Vee model, Decision making during system design. Six functions of design process, System architectures.	3
System requirements analysis, specifications, documentation.	2
<b>System Architecture Development:</b>	
Functional Architecture.	5
Physical Architecture.	5
Operational Architecture and interface.	4



NP-TEL

# NPTEL

<http://nptel.iitm.ac.in>

## Engineering Design

### Additional Reading:

1. E K Antonsson and J Cagan (Ed) Formal Engineering Design Synthesis, Cambridge University press, NY, 2001.
2. A Ertas & J C Jones, The Engineering Design Process, John Wiley and Sons, 1993.
3. A Chakrabarti (Ed.), Engineering Design Synthesis, Springer, 2002.

### Hyperlinks:

<http://www.vitechcorp.com/>

(software tool for system modelling)

### Coordinators:

**Dr. T Asokan**  
Engineering Design IIT Madras

System Integration and qualification.	5
<b>System modelling:</b>	
System modelling through IDEF0 models.	2
Higraphs, N2 charts.	2
Decision analysis for design tradeoffs.	2
Decision making under uncertainty.	2
Software tools for system design.	2
System Failure Analysis.	2
<b>Total</b>	<b>38</b>

**References:**

1. Dennis M Beude, The engineering Design of Systems: Models and Methods, Wiley India, 2006.
2. Alexander Kossaikoff, William N Sweet, Systems Engineering: Principles and Practice, Wiley India, 2010.