SYSTEM INTEGRATION AND VALIDATION

(SYSE- 803)

Credit Hrs 3.0

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1. **Pre-requisite:** UG level courses of Engineering.

2. **Course Objectives:** The purpose of the course is to provide the students with knowledge on:

   a. Systems integration theory
   b. Understanding of a set of metrics to predict the level of systems integration
   c. Identification of the key issues that plague Systems Engineering management with the consequences of bad Systems Engineering
   d. Systems Engineering integration to Systems Engineering practice

3. **Outcomes:** After the course the student will have a firm, all round knowledge on a fundamental approach to a major engineering problem, the integration of large complex systems, which should result in genuinely innovative system design and considerable improvements in reliability and savings at all stages of the system lifecycle.

4. **Course Contents:**

   a. Importance of Integration.
      (1) Introduction
      (2) Hubble Space Telescope Systems Engineering Case Study
      (3) Principles of Integration
   b. Essences of Interaction
      (1) Introduction to Interaction
      (2) Epistemology of Systems Engineering Integration
      (3) Boundaries & Mechanism
   c. Foundations of Systems Integration
      (1) Purpose of Systems Integration
      (2) Tasks of Systems Integration
      (3) General Ontology & Metrology of Integration
      (4) Dynamics of Integration
      (5) Axioms of Integration
   d. Integrations in Systems Engineering Context
      (1) Introduction, Nature, Issues and limits of Systems Engineering
      (2) Defining the problem
      (3) Process Models and Complexity
   e. Systems Integration Management

(1) Granularity and Integration
(2) Abstraction
(3) Project Management
(4) Integration as a Recursive Process
(5) Measures of Integration
(6) Integration Planning concepts
(7) Patterns in Systems Engineering and Patterns in Systems Integration

5. **Text Books/Reference Material:**

a. Langford, G. O., *Engineering Systems Integration: Theory, Metrics, and Methods*, 1st ed. CRC Press, 2012.
b. Grady, J. O., *System Integration*,1st ed. CRC Press, 1994.
c. Blanchard, Benjamin S., Fabrycky, Walter J., *Systems Engineering and Analysis*, 5th ed. Prentice Hall International Series, 2010.
d. Various case studies.