

1.	Title of the course	Strategic Systems Engineering
2.	Course number	EE569L
3.	Structure of credits (L-T-P-C)	3-0-0-3
4.	New course/modification to	New
5.	To be offered by	Electrical Engineering
6.	Proposed by	Naveen K P
7.	Prerequisite	CoT
8.	Course Objective(s): To provide a comprehensive understanding of systems engineering principles, focusing on the design, development and management of complex strategic systems, including their life cycles, safety, security and integration of advanced technologies like Artificial Intelligence (AI).	
9.	Course Content: Introduction to Systems Engineering (SE): origins, examples of systems requiring SE, key approaches and activities, structure of complex systems, interfaces and interactions, complexities of modern systems and insights from International Council on Systems Engineering (INCOSE) and Systems Engineering Body of Knowledge (SEBoK); System life cycle: requirements analysis, system requirements specifications, lifecycle support documentation, system upgrades, testing methodologies and management of system development and risks; Types of systems: strategic systems, mission-critical systems, real-time systems, software-defined systems, human-machine interfaces, software-hardware partitioning, systems architecture, fault tolerance, graceful degradation and detection and avoidance of single point failures; System design considerations: power and weight budgets, response times, safety protocols, secure systems, military-grade ruggedness, electromagnetic interference / electromagnetic compatibility EMI/EMC compliance, Electro-Magnetic Pulse (EMP) proofing, cyber hardening and challenges of multi-terrain operations (high altitude, desert, etc.); Integration of advanced technologies: embedding machine learning, deep learning and generative AI in systems with “man in the loop” and “sit in the loop” approaches, as well as edge AI applications.	
10.	Textbook(s): 1. Kossiakoff A, Sweet W N, Seymour S J and Biemer S M, Systems Engineering: Principles and Practice, 2nd Edition, Wiley (2011).	
11.	Reference(s): 1. INCOSE (Ed.), INCOSE Systems Engineering Handbook: A Guide for System Life Cycle Processes and Activities, Version 5.0, Wiley (2023). 2. SEBoK (Ed.), Guide to the Systems Engineering Body of Knowledge (SEBoK), Version 2.10, Hoboken, N J: The Trustees of the Stevens Institute of Technology (2024).	