IEOR E4520 – Fall 2014
Applied Systems Engineering
Instructor: Ebad Jahangir, Ph.D.

Course Description: Systems engineering has been described as the art and science of developing systems that can meet stakeholder requirements within imposed constraints. This class is an introduction to the hard and soft skills that are required of good Systems Engineers. Lectures follow the competency models for Systems Engineers and include topics such as systems thinking, needs identification, requirements formulation, architecture definition, technical management, design integration, as well as verification and validation of designs. Some of the key SE Standards will be covered and the roles of organizations in enabling engineers to develop systems will be explored.

Applications of SE concepts and tools in various settings will be discussed through examples and case studies. Students will learn to apply the SE methodologies in modern complex system development environments including aerospace and defense, transportation, energy, communications, and modern software-intensive systems.

After taking the class, the students will become familiar with the key SE related terms and definitions as well as various SE lifecycle models. They would be able to understand the rationale for and the value of SE concepts and principles in addition to understanding the roles and responsibilities of systems engineers. They will learn the importance of a holistic and integrative view of systems that incorporates and balances the contributions of the "standard" engineering disciplines plus cross-cutting ones to produce a coherent whole that no single discipline dominates.

Intended Audience: Engineers with depth in one "technical" discipline who have some practical experience in an interdisciplinary environment and who want to lead design and engineering projects.

Prerequisites: B.S. in Engineering or Applied Sciences; at Least 5 years experience (Recommended)
Calculus, Probability and Statistics, Optimization, Linear Algebra, and Basic Economics

Required Text(s): None

Reference Text(s):

- INCOSE SEBoK
- NASA SE Handbook
- System Engineering Management by Blanchard; 4th Edition
- Systems Engineering Principles and Practice by Kossiakoff, Sweet, Seymour, and Biemer; 2nd Edition
- Decision Making in Systems Engineering and Management by Parnell, Driscoll and Henderson; 2nd Edition
- The Art of Systems Architecting by Rechtin and Maier; 3rd Edition
- Links to other material will be provided

Homework: Based on lecture materials

Grading:

	Class Room Students	CVN Students
Weekly problem sets:	40%	50%
Class Participation:	20%	-
Final Project:	40%	50%

Course Outline:

Lecture 01.	Course overview; Intro to SE
Lecture 02.	SE Management; SE Thinking
Lecture 03.	SE Competencies
Lecture 04.	Requirements Definition and Management
Lecture 05.	System Architecture; Robust SE
Lecture 06.	Guest Lecture
Lecture 07.	Risk Management
Lecture 08.	Learning from Failures; Lean SE; Project Management
Lecture 09.	Systems Engineering Management
Lecture 10.	Guest Lecture
Lecture 11.	Technical Decision Analysis
Lecture 12.	Ilities; Validation and Verification; SE Leadership Skills
Lecture 13.	Final Project Presentations