WebCampus.Stevens
Syllabus

SYS625: Fundamentals of Systems Engineering
Cross-listed as: CPE625
Course Prerequisites: none

Overview

Fundamentals of Systems Engineering course introduces students to the principles and processes of systems engineering. The course enables them to more effectively design solutions that meet customer needs. The course centers on a group project that students pursue in small teams. Fundamentals of Systems Engineering provides students with a disciplined approach for identifying a customer or stakeholder need and translating that need into a complete set of requirements or specifications for a system that meets the need. The focus is on developing an outside-in view that treats the system as a black box, without regard to the components from which it will be built. The course emphasizes the distinction between an operational need and a system solution, and stresses the importance of understanding the customer need before jumping to a solution. The intent is not just to describe the systems engineering and architecting process. Rather, the course helps students understand how to think through the choices at each step of the process. What decisions have to be made? What factors should be considered in making them? It is the answers to these questions that make for good systems engineering, not just adherence to a standard process. The primary objective of this course is to achieve a strong foundation in systems engineering principles and processes.

Learning Goals

After taking this course, the student will be able to:

- Understand the need for good systems engineering up front and throughout the life cycle of the system.
- Review and evaluate the various system engineering models in use today.
- Differentiate between the operational need and the system solution to be implemented.
- Select from a wide range of system concepts as the first step in system design.
- Derive quantitative system requirements that best meet the functions and performance requirements of the system.
- Adopt a systems perspective when making decisions that affect performance or total ownership cost of the system.

Pedagogy

The course will employ lectures, supplemental reading and additional resources, quizzes, online discussion, term papers, weekly team assignments and a final team project.

Required Text(s)

•**Applied Space Systems Engineering (Space Technology Series**) by Wiley Larson, Doug Kilpatrick, et al (Learning Solutions, 2009)
•**The Innovator's Dilemma** by Clayton M. Christensen (HarperBusiness, 2003)
All are readily available in paperback from online booksellers (e.g. Amazon). (Any edition)

Required Readings

Required Readings may be assigned for each week and will be found on the course website.

Software

A requirements management tool: CORE will be provided in class, and used. The University edition of CORE is provided at no charge to the students of this course.

Course Outline

The course is divided into thirteen modules that are completed over the same number of weeks. Students are required to complete one team assignment and one quiz each week. Beginning in the second week, they also required to participate in an online discussion of the work of the previous week. There is no discussion or a quiz following the assignment for the thirteenth week -- that assignment is to complete and post a final report on the team project in the form of an abbreviated Systems Requirement Review (SRR). To promote full team member participation, students are required to assess their own contributions and other members of their team about midway in the semester and then again towards the end of the semester, prior to the grading of the final team project.

Student Performance Assessment and Assignments

Specific details on the weekly assignments are found on the course website.

GRADED EVENTS	% of Course*
Individual class participation (discussions, team assessments)	
Individual term paper(s), quizzes, weekly assignments	60-70%
Final Team project/presentation	30-40%
TOTAL	**100%**

Please note that assignments and papers in this class may be submitted to www.turnitin.com, a web-based anti-plagiarism system, for an evaluation of their originality.
Projects and homework are scheduled for submission on the dates shown on the course Calendar.
Prior approval must be received for late assignments, and may affect the earned points.

*Check the course materials for the specific breakdown

Grading and Criteria for Passing

(1) Turn in all written material (see weekly assignments on the course website).
(2) Final grades will be awarded in accordance with the following scale:

Grade	Percentage
A	93 - 100
A-	90-92
B+	87 - 89
B	83-86
B-	80-82
C+	77-79
C	73 – 76
C-	70-72
F	<70

Course Schedule

Week #	Topic
1	Business Drivers for Systems Engineering
2	Overview of the Systems Engineering Process
3	Identifying Stakeholders and Stakeholder Requirements
4	Generating, Evaluating, and Selecting Concepts
5	System Scope, Context Diagrams, Use Case Scenarios
6	From Stakeholder Requirements to System Objectives
7	Completing the System Requirements
8	Using a Requirements Management Tool (CORE)
9	Developing the Functional Architecture
10	Using a Functional Modeling Tool (CORE)
11	Fundamentals of Life Cycle Analysis
12	Risk Management and Other Program Issues
13	System Requirements Review (SRR)