SYSEN 5400/5410/MAE 5950 Fall 2016 Schedule
Updated 08/13/2016

Date	Lecture#	Topic	Main concepts and tools	Assignment out	Assignment due
8/24/2016	L1	Introduction	What is Systems Architecture? Role of the architect. Definitions: Function, form, concept. Overview of the course.		
8/26/2016	R1	Concepts of graph theory	Nodes, edges, adjacency matrix, centrality measures, flows, paths		
8/29/2016	L2	Stakeholder analysis	Identifying and characterizing stakeholders and their needs. Kano analysis. Stakeholder value networks.		
8/31/2016	L3	Concept generation and selection	Concept templates, integrated concepts, solution-neutral, morpholpogical matrix, TRIZ, Pugh matrix	HW #1	
9/2/2016	R2	Intro session to SysML	Main types of diagrams		
9/5/2016		No class			
9/7/2016	L4	Functional architecture	Function, Functional templates, SysML behavioral diagrams, House of Quality, DSM sequencing		
9/9/2016	R3	Examples of architecture description with SysML			
9/12/2016	L5	Physical and allocated architecture	SysML structural diagrams (block definition, internal block), DSM, DMM, MDM, clustering		
9/14/2016	L6	Architecture frameworks	Focus on DoDAF and comparison with other frameworks	HW #2	HW #1
9/16/2016	R4	Concepts of set theory and counting	Rule of sum and product, inclusion-exclusion. Examples with architecture spaces		
9/19/2016	L7	Architecture enumeration I: enumerable models	Enumerable models, patterns in architectural decisions, architecture decision graphs, counting		
9/21/2016	L8	Architecture enumeration II: Generating all alternatives	Nested-for loops, mixed radix algorithms, Hasse diagrams, partition and permutation algorithms		
9/23/2016	R5	Examples of enumerating all architectures	Binary and mixed radix tricks		
9/26/2016	L9	Architecture enumeration III: Random sampling	Generating random binary and integer sequences, random partitions and permutations		
9/28/2016	L10	Architecture enumeration IV: Deterministic sampling	Reference architectures, using design of experiments to sample the architecture space	HW #3	HW #2
9/30/2016	R6	Examples of generating random and deterministic architectures	Inverse transform sampling, Matlab sampling functions		
10/3/2016	L11	Architecture evaluation I: Cost	SE triangle, cost modeling, NPV/IRR, TRL, schedule, programmatic risk		
10/5/2016	L12	Architecture evaluation II: Operational and Programmatic Risk	Basic reliability theory: min cut sets, component reliability, weibull		
10/7/2016	R7	Examples of estimating architecture cost and reliability	Poisson, exponential and binomial distributions. Reliability.		
10/10/2016		No class			
10/12/2016	L13	Guest lecture - Siri	Architecture of buildings. What can we learn from "real" architects?		
10/14/2016	R8	Project Q&A session			
10/17/2016	L14	Architecture evaluation III: Performance	Multi-attribute utility theory, Monte Carlo simulation	HW #4	HW #3
10/19/2016	L15	Guest lecture: Inki Min	Defense and aerospace systems architecture		
10/21/2016	R9	Examples of simulating performance of architecture			
10/24/2016	L16	Architecture tradespace I: Pareto front analysis	Pareto front, algorithms for finding it, structure of tradespace, basic data mining (association rule mining)		
10/26/2016	L17	Architecture tradespace II: Sensitivity analysis	Sensitivity analysis, sensitivity and connectivity, order of architectural decisions		
10/28/2016	R10	Examples of sensitivity analysis in architecture			
10/31/2016	L18	Architecture tradespace III: Surrogate models	Surrogate models, lasso, classification trees	Quiz	HW #4
11/2/2016	L19	Architecture optimization I: Fundamentals and genetic algorithm	Intro to optimization, evolutionary algorithms, basic genetic algorithm		
11/4/2016	R11	Examples of optimization with GA			
11/7/2016	L20	Architecture optimization II: Multiobjective GA & local search	Genetic operators, local search.	HW #5	Quiz
11/9/2016	L21	Architecture Ilities I: Flexibility, robustness	Measures of Robustness, Value of information, Value of flexibility, real options analysis, time paths in tradespace		
11/11/2016	R12	Examples of incorporating flexibility in architecture			
11/14/2016	L22	Architecture Ilities II: Commonality, modularity, platforms	Legacy systems, reactive commonality (reuse), proactive commonality (platforms), modularity		
11/16/2016	L23	Guest lecture - Software			
11/18/2016	R13	Project Q&A session			
11/21/2016	L24	Wrap-up			HW #5
11/23/2016		No class			
11/25/2016		No class			
11/28/2016		Project presentations			
11/30/2016		Project presentations			
12/2/2016		Project presentations			
		Final report due on 12/9			