Fall Semester 2009

Course: ETLS 507 Introduction to Systems Engineering

Time: Saturday 9:00 – 12:00 pm

Location: Saint Paul

Instructor: Robert J. Monson
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Background:

B.M.E.	1985	University of Minnesota
M.M.S.E.	1991	University of St. Thomas
Ph.D.	1999	University of Minnesota

Required Texts:

INCOSE Systems Engineering Handbook – reference text

Course Description:

This class considers the engineering of both natural and human-made systems as well as the analysis of those systems. The principal focus of the course will be relating to the initial creation and development of complex systems. In general this will relate to the development of systems which cross multiple domains of expertise. The course will convey to the students the essential elements of systems engineering; including systems thinking, systems analysis, system architecture, the decomposition and recomposition of systems design, risk management, reliability, maintainability and availability, and the coherent structure of a systems view. This course will be ideal for any student seeking to expand their current project management skills to enable them to effectively execute large and complex programs, or simply to manage their current projects with a systems view perspective.

Course Objectives:

By the end of the course the student should be able to demonstrate a general knowledge of Systems Engineering methodologies and skills, and exhibit a heightened awareness of the challenges facing a Systems Engineer.

Learning Outcomes:

Upon successful completion of the course, the student will be able to:

Outcome	Mechanism	Objectives
1. Understand Systems Thinking	M,T,C	MS1, TM1, SE2, SE7, YE1, YE2, YE5
2. Define and formulate the underlying requirements of a project.	P,M,T,F,C	SE1, SE5, TM1,TM4, MS3,MS7, YE1, YE2, YE5
3. Plan and document a project or program, including a i. Performance Specification ii.Project Schedule iii.Project Budget	M,T,C	SE3, SE12, TM3, MS4, MS5, YE1
4. Understand Acquisition models and Life Cycle Cost	M,F,C	SE1, SE5, TM2, TM4, MS6, YE3
5. Understand functional analysis and systems architecture	P,M,T,F,C	SE5, SE12, TM1, TM3, MS4, MS9, YE1, YE3
6. Understand reliability, maintainability and availability.	P,M,T,F,C	SE5, SE12, TM1, TM3, MS4, MS9, YE3, YE4
7. Recognizing the value of coherence in systems engineering.	P,M,T,F,C	SE7, SE8, SE9, SE10, SE12, TM3, TM4, MS4, MS5, MS7, YE1, YE2, YE3, YE4, YE5

Course Methodology:

A mix of lecture, case studies, class discussion, in-class role playing, and student presentations will be used to cover the course materials.

Major Assignments:

The students will be responsible for the following elements of class

1) Panel Presentation (P)	20%
2) Exam - Midterm (M)	20%
3) Term Paper (T)	25%
4) Exam - Final (F)	25%
5) Class Participation (C)	10%

An important aspect of this class is an ability to synthesize the concepts presented, with personal experiences, knowledge and abilities. Everyone in class will benefit from your participation.

Grading Policy:

Class members will be graded on a curve based on overall performance of the class. Late papers will not be encouraged. Grades will be affected by timelines of completion.

Academic Integrity:

All students are expected to understand and follow the University of St.Thomas policies on Academic Integrity. These are described at: www.stthomas.edu/engineering/graduate/policies

Don't cheat and don't plagiarize.

Here are five ways of plagiarizing:

1. Word-for-word continuous copying without quotation marks or mention of the author's name.
2. Copying many words and phrases without quotation marks or mention of the author's name.
3. Copying an occasional key word or phrase without quotation marks or mention of the author's name.
4. Paraphrasing without mention of the author's name.
5. Taking the author's idea without acknowledging the source.

If there is anything about plagiarism you do not understand, ask your professor.

Attendance:

Students are expected to attend all class sessions. Circumstances that prevent attendance will be honored up to two instances. Absences in excess of two times will result in a lowered grade for the course. Contact the instructor when a special situation arises. All absences require that the instructor be informed in advance.

Presentation:

This will be discussed during the first session of class. The ability to make coherent and thoughtful presentations is critical for personal success. Although most of us don't enjoy presentations, they will provide a strong foundation for future needs. Please try to approach the presentation as an opportunity to learn rather than an aspect to endure.

Course Outline – ETLS 507

Date	Topic(s)	Assignment(s)
Week 1	Course Overview Logistics of the course	
Week 2	Elements of SE - Systems Thinking - Concurrent Engineering	INCOSE text
Week 3	Project Management Total Quality Management	INCOSE Text
Week 4	Products / Life Cycles / LCC	DODAF views
Week 5	Acquisition Models	DODAF Views
Week 6	Requirements Development / Strategy	System Requirements
Week 7	Functional Analysis and Allocation Midsemester Course Evaluations Midterm Exams handed out	Midterm Exam
Week 8	Design Synthesis / Systems Architecture Midterms Due	System Design
Week 9	Risk Management Integration and Verification	Risk Analysis
Week 10	Reliability, Maintainability and Availability	RMA Plan
Week 11	Usability / Human Factors	HSI Plan
Week 12	Verification and Validation Coherence in Systems Engineering Term Papers Due	V&V Plan
Week 13	Reporting on Student Projects Final Exam Handed Out	Presentations
Week 14	Systems Engineering Summary Final Course Evaluations Final Exam Due	

To: ETLS 507 Intro to Systems Engineering Class

From: Robert J. Monson

Subject: Term paper evaluation criteria

The term paper is an important part of the Systems Engineering course requirements. Therefore, it is important that you think about this paper and its ground rules early in the semester.

The specific subject of the paper is one that you have chosen, however, it is expected that the paper's focus will be a case study of a realistic project using the techniques and key elements of the Systems Engineering course material.

You should support your approach with clear references to the counsel and experiences of experts in the field. Use of your personal or project opinions is valid, but should be liberally supported with outside justifications.

This is a demanding chore so the topic selected should not be too broad. The length of the paper should be about (10 * the numberof people in your group) typewritten double-spaced pages, and must include a bibliography of reference material to support your recommendations.

The paper must adhere to the *APA Publication Manual* (American Psychological Association) format criteria. This text is available in most libraries and bookstores. Please also note that the paper should be handed-in without report covers or other amenities.

It might be helpful to examine some of the attributes that are looked for in Systems Engineering reports in industry in general and in the grading criteria for this specific course.

Your team will also be responsible for presenting your System design in a project outbrief format using the template provided in class.

Instructive Value

Is it clear to the reader or would further study and research be needed to totally grasp the subject?

Application/Implementation

Is the recommended course of action persuasive, reasonable, financially feasible, and can it be implemented?

Style and Impact

Is it professional, succinct and easy to read?

Are key concepts highlighted?

Are there clear recommendations of how to implement? A well-constructed concluding section brings the paper to a graceful conclusion.

Format, Clarity, Spelling, Structure, etc.,

Are acronyms spelled out?

Does it follow from problem description -- to discussions of solutions--to selection of solutions --to justification--to conclusion?

Misspellings are a serious distraction to the reader. With all the spell checkers available, there is no good excuse, although there have been creative ones.

Bibliography & References

It is appropriate to provide evidence that the most relevant scientific work of others or the relevant experiences of others were considered in your analysis and proposal. As a rule of thumb, 6 to 10 references is a reasonable number for a paper of this size.

We will discuss these term paper requirements as the semester progresses, but we want you to start planning early. This is after all the nature of project management.

Remember to include the pertinent sections of any research paper:

Abstract
Introduction
Body
Summary and Conclusions

Student:_____

Intro to Systems Engineering
Project Assessment

(1 low - 5 high)

Construction									
Introduction	**1**		**2**		**3**		**4**		**5**	
Summary	**1**		**2**		**3**		**4**		**5**	
Body	**1**		**2**		**3**		**4**		**5**	
Summary	**1**		**2**		**3**		**4**		**5**	
DODAF	**1**		**2**		**3**		**4**		**5**	
Grammar/Spelling	**1**		**2**		**3**		**4**		**5**	
Risk Management	**1**		**2**		**3**		**4**		**5**	
Style and Impact									
Professional									
Succinct	**1**		**2**		**3**		**4**		**5**	
Audience Aware	**1**		**2**		**3**		**4**		**5**	
Questions	**1**		**2**		**3**		**4**		**5**	
	1		**2**		**3**		**4**		**5**	
Systems Engineering									
User Needs	**1**		**2**		**3**		**4**		**5**	
System Requirements	**1**		**2**		**3**		**4**		**5**	
Functional Req / Alloc	**1**		**2**		**3**		**4**		**5**	
System Architecture	**1**		**2**		**3**		**4**		**5**	
System Design									
Physical Architecture	**1**		**2**		**3**		**4**		**5**	
Decomposition	**1**		**2**		**3**		**4**		**5**	
Design relevancy	**1**		**2**		**3**		**4**		**5**	
Verification and Validation									
System									
Subsystem/Component	**1**		**2**		**3**		**4**		**5**	
	1		**2**		**3**		**4**		**5**	

100 Total Possible Points

Total Score:_____

Comments:

Student:_____

Intro to Systems Engineering
Presentation Assessment

(1 low - 10 high)

Construction

Introduction	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	
Outline	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	
User Needs	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	
Sys Requirements	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	
Sys Architecture	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	
System Design	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	
V&V	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	

Speaking Skills

Presence	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	
Comfort / Ease	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	
Knowledge	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	
Coverage/Construct	**1**		**2**		**3**		**4**		**5**		**6**		**7**		**8**		**9**		**10**	

110 Total Possible Points

*Total Score:*_____

Comments: