

# SSIE525 – PRINCIPLES OF SYSTEMS ENGINEERING

## Fall '09 - Course Syllabus



**Instructor:** Nadiye O. Erdil

**Office:** EB-L5

**Course Days/Time:** Monday-Wednesday 1:15-2:25pm

**E-mail:** [nadiye@binghamton.edu](mailto:nadiye@binghamton.edu)

**Office Hours:** Th. 11:00am-1:00pm

**Course Place:** EB-J23

### **Course Description:**

This course provides a foundation for understanding and applying basic principles of Systems Engineering. The course will address: (1) system design process, (2) systems analysis, (3) system design evaluation, and (4) systems engineering management. The emphasis will be on system life cycle phases, which includes identification of customer need, conceptual/preliminary/detail design, implementation, test, and evaluation; and the exploration of how the principles of systems engineering are applied across these phases. System design and analysis methods and techniques such as design for reliability, design for affordability, economic evaluation models, and control concepts will be discussed.

### **Course Objectives:**

Upon completion of this course, the student should have acquired the following skills:

- Establish a basic understanding of system and systems engineering concepts and terms
- Design/analyze/evaluate systems from a systems perspective
- Identify/evaluate/execute tools useful in Systems Engineering

### **Required Textbooks:**

Blanchard, Benjamin S., Fabrycky, Walter J., *Systems Engineering and Analysis*, Fourth Edition, Prentice-Hall, 2006.

### **Additional References:**

Eisner, H. *Essentials of Project and Systems Engineering Management*, 2<sup>nd</sup> Ed. John Wiley & Sons, Hoboken, NJ, 2002

Wasson, C. *Systems Analysis, Design and Development; Concepts, Principles, and Practices*. John Wiley & Sons, Hoboken, NJ, 2006.

DAU, *Systems Engineering Fundamentals*. Defense Acquisition University (DAU) Press, Fort Belvoir, VA, January 2001. Available online at [http://www.dau.mil/pubs/gdbks/sys\\_eng\\_fund.asp](http://www.dau.mil/pubs/gdbks/sys_eng_fund.asp)

NASA *Systems Engineering Handbook*, SP-2007-6105, Rev 1. December 2007

<http://education.ksc.nasa.gov/esmdspacegrant/Documents/NASA%20SP-2007-6105%20Rev%201%20Final%2031Dec2007.pdf>

International Council on Systems Engineering: <http://www.incose.org>

### **Grading Policy:**

The following sections explain evaluation of the work for the course. Policies listed below will be exercised unless there are exceptional circumstances. Any “exceptional circumstance” will be considered on an individual base. The student must contact the instructor without delay in such cases.

**Grade Calculation:**

Homework	20%
Mid-term Exam	25%
Term Project	20%
In-class performance & presentations	5%
Final Exam	30%

**Letter Grade Policy:**

Policy on “Incomplete”: Failure to satisfactorily complete the requirements of the course in a timely manner will not result in an “I,” but in a grade of “F.” A letter grade of “I” (Incomplete) will be given only in the case of serious long-term medical or other emergency, with documentation.

**Exams:**

Mid-Term Exam: Mid-term exam will be given on the day it is scheduled. There will be no make-up exams.

Final Exam: A Comprehensive Final Exam will be given. No make-up Final Exam can be given. The Final Exam will be given only at the time scheduled by the University. If the Final Exam is missed, a score of zero (0) will be recorded and used to calculate the letter grade.

**Assignments:**

Homework: Individual work. Combination of journal paper reviews and questions from the textbook. The journal paper review will require students do a literature review on the topic(s) asked, find related journal articles, and using these articles prepare a paper to discuss the topic(s). The work on journal paper reviews will be evaluated based on student’s approach to the topic(s), quality of the articles used (must be peer reviewed), and how they are incorporated into the student’s paper.

Term-project: Group work (3 or 4 students). The project consists of defining a system, understanding customer needs, discovering system requirements, modeling the system, investigating the alternatives using one or more of the methods covered in the class, and implementation recommendations. The system selected could be an existing or a new system from literature or related to your research project/your work. In the case of selecting a system from literature, copies of all references must be provided. An initial, interim, and a final project reports, and an in-class presentation (per group) of the project are required. The initial report will contain the definition of the system selected, and description of how it will be utilized for the project. The interim report is a half-time progress report of the project that outlines and shows the status of the tasks required for project completion. The final report is a documentation of the overall project. Reports will be primarily evaluated on completeness and organization of work provided. Describing the project and conveying the alternatives and recommendations developed will form the basis for the presentation evaluation.

Assignment Evaluation: Assignment dates are indicated on the course calendar. Assignments are considered late after the beginning of class on the due date. A deduction of 15% will be taken for assignments received after the beginning of class and prior to 10:00am on the day following the due date. No assignments received after this day/time will be graded for credit. In-class presentations will receive a credit only if they are done on their scheduled day.

Requests for Review of Scores on Assignments: To request a review of a score on any assignment (homework, paper, etc.), a written request (not an email) must be submitted to the

instructor. This request should list specific items that are to be reviewed. Note: A request for review will result in a complete regrade of the assignment, not only those items listed in the request. Requests for the review of recorded scores will only be accepted for 14 calendar days after scores are announced.

**Attendance and Tardiness:**

Required attendance (and tardiness) policy will not be exercised, but attendance (and punctuality) is expected.

**Class Participation:**

Class participation is essential for the continuity of the course. Students are expected to come prepared (completing the reading assignments prior to class day/time i.e. 09/21/09 reading assignments should be completed before the class time on that day) and be ready to discuss the readings.

**Professional Conduct:**

All students are expected to practice and display a high level of personal and professional integrity. The policies of the Thomas J. Watson School of Engineering and Applied Science will be followed.

Please **silence all electronic devices (phones, Palms, Pocket-PC's, I-pods, pagers, etc.)** during class. Use of earphones is not allowed during classes.

**Academic Misconduct:**

Any assigned work must be entirely the student's own work. However, consultation and discussion with other students regarding homework and projects is acceptable. But please note: COPYING HOMEWORK/ASSIGNMENT FROM ONE ANOTHER WILL BE CONSIDERED ACADEMIC MISCONDUCT. Plagiarism (misrepresentation of the source of work) in any form will be considered academic misconduct. During examinations, each student should conduct himself or herself in a way that avoids even the appearance of cheating. Any academic misconduct will result in a grade of "F" for this course.

In addition to a failing grade, academic misconduct will be dealt with according to the policies of the Thomas J. Watson School of Engineering of the State University of New York at Binghamton: [http://www.binghamton.edu/watson/Watson\\_Academic\\_Honesty\\_Policy.pdf](http://www.binghamton.edu/watson/Watson_Academic_Honesty_Policy.pdf)

**Services for Students with Disabilities (SSD) :**

Accommodations will be made for students with special requirements. Students who have special testing requirements, as determined by Services for Students with Disabilities (SSD), are required to submit documentation from SSD to the instructor within two weeks of enrollment in the course. The instructor and the student, along with SSD, will determine an alternative test system that satisfies the student's requirements and professional standards. This alternative test system must be determined prior to any quiz or exam to which it will apply, otherwise the grade received during the "non-alternate" exam or quiz will be recorded.

**SSIE525 – PRINCIPLES OF SYSTEMS ENGINEERING**  
**Fall 2009 – Tentative Course Calendar\***

<b>Week</b>	<b>Date</b>	<b>Content</b>	<b>Readings</b>	<b>Assignments</b>
1	31-Aug	Introduction, Course Overview, System Definitions & Concepts	CH1	
	2-Sep	System Life Cycle, Systems Engineering Process, Design Reviews, Term Project Review	CH2	<i>Term Project</i>
2	7-Sep	No classes-Labor Day		<i>Homework#1</i>
	9-Sep	Conceptual System Design, Systems Requirements Analysis, Preliminary system Design	CH3, CH4	
3	14-Sep	Detailed Design & Development, Systems Test & Evaluation	CH5, CH6	
	16-Sep	Design for Reliability	CH12	
4	21-Sep			<u>Due:</u> Homework#1
	23-Sep		<u>Due:</u> TP initial report	
5	28-Sep	No classes-Yom Kippur		
	30-Sep	Design for Reliability		<i>Homework#2</i>
6	5-Oct	Design for Maintainability	CH13	
	7-Oct			
7	12-Oct			<u>Due:</u> TP interim report
	14-Oct	Design for Usability	CH14	<u>Due:</u> Homework#2
8	19-Oct	Mid-Term Exam		
	21-Oct	Design for Supportability	CH15	
9	26-Oct	Design for Affordability	CH17	<i>Homework#3</i>
	28-Oct	Models in decision making	CH7.1-4	
10	2-Nov	Models in decision making	CH7.5-7	
	4-Nov	Economic evaluation models	CH8	
11	9-Nov			<u>Due:</u> Homework#3
	11-Nov	Optimization in design & operations	CH9	
12	16-Nov	Queuing Theory		
	18-Nov		CH10	<i>Homework#4</i>
13	23-Nov			
	25-Nov	No classes-Thanksgiving		
14	30-Nov	Control Concepts	CH11	<u>Due:</u> TP Report
	2-Dec	Project Presentations		<u>Due:</u> Homework#4
15	7-Dec			
	9-Dec			
16	14-Dec Monday	FINAL EXAM 2:00-4:00pm FA246		

\*Course Calendar: subject to change without notice