

ISE 356 Introduction to Systems Engineering and Decision Analysis

Fall 2019

Instructor

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Office: Mohler Lab Room 325 Ext. 85868

Office Hours: 2-3pm T,Th or by Appointment

Prerequisites: ISE 230 and ISE 240 or equivalent.

Classroom: I have reserved both Mohler 375 and Mohler 121 (Computer lab) for this course. We'll use Mohler 375 until we start working with the software (Labs). From then on, we'll switch as needed. For using the software we'll use the computer lab (Mohler 121).

Course Website: Course materials, assignments and your grades will be posted on "Course Site". You are responsible for keeping track of your grades and general progress in the course, so please visit the site regularly. All due dates for homework and projects, as well as changes to the assignments will be posted on the course site.

Catalog Course Description:

Systems Engineering modeling techniques. Architectures for large scale systems design. Includes physical, functional, and operational architectures. Requirements engineering, interface and integration issues, graphical modeling techniques. Additional topics may include: decision analysis techniques for systems, uncertainty analysis, utility functions, multiattribute utility functions and analysis, influence diagrams, risk preference, Analytical Hierarchy and Node Processes in decision making.

Course objectives:

The objective of this course is to introduce the area of systems engineering and industry standard tools to our students - emphasis is on Information Technology industry, but the techniques introduced are applicable to all industries. Particularly useful to students aiming for jobs in the IT industry and/or Consulting.

Upon completion of this course students will:

- know the basic concepts in Systems Engineering
- be able to work with tools and methods of Systems Engineering
- understand system development life cycle
- understand systems modeling concepts, methodologies
- Gain some experience with commercial systems modeling tools.

Topics:

- Introduction to Systems Engineering
- Systems Development & Maintenance Process

- Systems Integration & Design
- Requirements, the process, kinds of requirements, writing requirements, traceability
- Modeling, history, types, usage
- Functional Diagrams, DFD's, E-R diagrams and generating LDM, PDM, FSM's for modeling behavior
- Using Commercial modeling software(CORE, Rational)
- Decision Making

Computer Programming is not required.

Course Philosophy: This course is in revision, reflecting the changes in our profession, and the direction our graduates take in practice of their profession. More and more of you will end up in consulting companies, and work as "System Analyst", "Systems Engineer". Or "project Managers". My goal is to better prepare you for the jobs you shall seek that will require a systems approach to problems in virtually any area, from information systems to manufacturing. In this course, I shall introduce you to many techniques used in the industry - and may not be always labeled as "System Engineering", but is part of system engineering toolbox. In some cases we shall use industry grade tools to practice and familiarize ourselves with what you may end up learning to use in detail when you get a job. This familiarity may actually significantly increase your chances when you are competing for jobs.

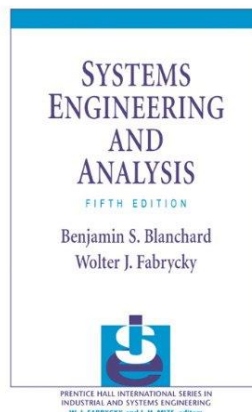
Since no textbook is perfect, there will be items presented in lecture that are not in the book. You will be responsible for these topics just as much as the ones that are in the book. Similarly, there are some things in the textbook that are better read than lectured. Just because it didn't appear in lecture doesn't mean it won't be in the homework or on the exams.

Textbook: There is no textbook in the bookstore for this course. I shall, however place in reserve the following two texts I have used in the past years.

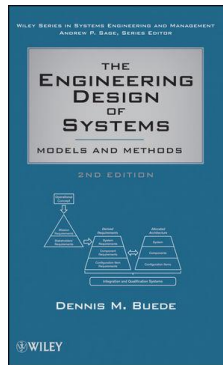
Systems Engineering and Analysis (4 or 5th Edition)

Prentice Hall International Series in Industrial & Systems Engineering

by Benjamin S. Blanchard, and Wolter J. Fabrycky



The Engineering Design of Systems, Models & Methods
By Dennis M. Buede, 2nd Edition, Wiley & Sons



Academic Honesty: Integrity and Honesty are vital in life, especially for engineers, since the systems we design or modify can improve people's quality of life, or can do irreparable harm. Using probability and statistics ethically requires that we state all of the facts and assumptions in as clear a manner as possible, to avoid "lying with statistics". We are also bound by honor to give credit where it is due. On quizzes and exams your work should be entirely your own. Violations of academic honesty will result in disciplinary proceedings.

Here is the statement of the Lehigh Student Senate on academic integrity from <http://www.lehigh.edu/~indost/conduct/aistatements.shtml>: "We, the Lehigh University Student Senate, as the standing representative body of all undergraduates, reaffirm the duty and obligation of students to meet and uphold the highest principles and values of personal, moral and ethical conduct. As partners in our educational community, both students and faculty share the responsibility for promoting and helping ensure an environment of academic integrity. As such, each student is expected to complete all academic course work in accordance to the standards set forth by the faculty and in compliance with the University's Code of Conduct."

I regard you all as "engineering professionals" at this stage and will treat you as such. I also expect you to behave as such in your conduct – not just in this class, but in all of your activities.

Homework: You will have regular homework assignments for most weeks. Homework assignments must be turned in during the class on the assignment due date. No credit will be given to the assignments turned in late.

In this class, you might ask others for help with a homework assignment. Once you write up your answer in your own words to turn in, it must be your own work. Naturally, Academic Honesty applies to your homework assignments too.

Homework assignments in this class will not be always complete and coherent - they are rarely so clearly stated in execution of your profession. Part of your learning is to deal with situations where you have to seek part of the question - be pre-warned.

Tests: I consider tests to be a good part of the learning you do in this class. Hence be prepared to spend time on them. Tests will be take home - open book notes etc. - and you will be given adequate time to complete and return them.

Class Preparation and Participation: You are expected to come to class regularly and to be prepared for each class by reading any assigned work ahead of time. I will post notes on *Course Site* in advance so that you may bring them to class if you wish. In addition, you are expected to participate in class discussions and ask questions when you are confused. A portion of your grade will be based on class participation.

Extended Absences and Missing HWs & Exams: If you believe you will miss two or more consecutive lectures due to illness, holidays, family emergencies, etc., please contact me as early as possible so that we can develop a plan for you to make up the missed material. Under no circumstances will I give credit for missed homework or exams unless you have discussed your absence with me in advance or in some cases a written excuse from a doctor or the Dean of Students.

Recording Devices and Cell Phones in the classroom: Any use of personal devices including cellphones, mp3 players etc. is strictly forbidden. If you have to use personal laptops for note-taking, care must be taken not to distract your fellow students.

Grading: Tentatively, your grade will be calculated as follows:

Note that these may change based on the number of assignments of each category, and changes will be announced and/or posted.

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| Homework assignments | 25% |
| Tests (2) | 40% |
| Project(s) | 30% |
| Class Participation | 5% |

Homework assignments will be given for most weeks.

Projects will be assigned - will vary in depth and complexity, proper time allotment will be made.

Accommodations for Students with Disabilities: If you have a disability for which you are or may be requesting accommodations, please contact both your instructor and the Office of

Academic Support Services, University Center C212 (610-758-4152) as early as possible in the semester. You must have documentation from the Academic Support Services office before accommodations can be granted.

Principles of Equitable Community

Lehigh University endorses The Principles of our Equitable Community (<http://www4.lehigh.edu/diversity/principles>). We expect each member of this class to acknowledge and practice these Principles. Respect for each other and for differing viewpoints is a vital component of the learning environment inside and outside the classroom.

Other Relevant University Policies

Religious Holidays <http://www.lehigh.edu/~incha/holidays.html>

Lehigh Computer Usage <http://www.lehigh.edu/security/computepolicy.html>

Academic Integrity <http://www.lehigh.edu/~infkli/AcademicIntegrity.htm>