SYSE 575
25 June 2018 through 8 September 2018

Systems Engineering Reducing Risk in Decision Making – Cybersecurity

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Narrative Summary of this Course:
This course introduces graduate students to the concept of risk in decision making through the example of cybersecurity. We will examine the concepts, techniques and tools for managing risk and making decisions as key components of the systems engineering process. In this course, risk connotes a measure of the probability and severity of an undesired event. This course begins with an overview of the risk management (identifying, assessing, monitoring, and mitigating) and decision process. Differences between mission critical and non-mission critical programmatic risk will be emphasized. Other topics include the limits of expected value-based risk analysis, decision making strategies such a max/min, min/max and regrets. Formal methods in risk analysis, elementary decision analysis and decision trees, multi-objective decision making, pareto techniques, optimality, and trade-off analysis will be covered. Risk and decision techniques will be contrasted with the interfacing processes of program management and software engineering, from both the government and industrial perspectives.

You are afforded the latitude to explore ideas without the fear of “grading”. There is a time and place for grades. Consequently, the quizzes become a focal point of discussion both inside and outside classes. A typical quiz might involve a short video on a topic related to a homework assignment or an upcoming examination. It is a good learning environment for you to discuss the topic and your ideas with the class (the class includes the professor). Quizzes are not graded! Quizzes are based on comments you receive back from the instructor; discussions during office hours; and quips and quotes that are strikingly insightful. There will be bi-weekly essays on topics aligned with
a subject chosen by the student.

All work in this course is individual work

However, that is not to say that you should ignore the work and thinking of your classmates (again, remembering to think of your professor as a student in the class). Copy and use freely anything that can help you, remembering to always cite the work of others. For example, if when you read something or hear something that you want to use or adapt to your use, you must cite the source, e.g., by stating “inspired by... (source and date)” All works of authorship are copyrighted the moment you or someone else writes them down, thereby objectifying those thoughts. Borrow a thought, give deserved credit to the source.

The Major Assignment

For your SYSE 575 Project, you are expected to complete a beginning-to-end analysis of risk for a system or system of systems. You MUST review your topics in terms of both a system and a system of systems. Substantiate the differences between the model of your topic as a system or system of systems. Starting with a problem, then design (with functional analysis), comprehensive architecture, stakeholders and their needs, principles, requirements (and their mappings to processes, functions, physical aspects), measures of performance, schedule for development or destruction, lifecycle issues, means to test, verify, and validate the solutions, identify and quantify the risks, determine the impact of these risks on decision making to solve the problem, and outline a risk mitigation plan. Your work requires a systems approach that identifies the functional relations between parts and the whole (all of which you must describe). Reducing risk in decision making is a primary focus for your project work. As such, please consider all topics in your systems engineering studies. You can expect that individualized feedback and your response will be time-consuming. The result is a personalized learning opportunity that is customized to your project, as a means of supplementing your knowledge with specific items that you need to extract a great amount of information from the course. In this regard, the instructor is your personal tutor with the agreed goal of assuring that you understand and can demonstrate all of the learning objectives.
Homework Assignments

The homework assignments are as follows:
V-1 Develop a workable definition of cybersecurity risk to be used in conjunction with
the model- based systems approach. Review the literature, broaden the definitions you
find to include systems aspects, and then develop and write a considered definition.
V-2 Define and outline your project topic. For your project topic, what problem do
stakeholders need to solve?
V-3 Describe the system or system of systems highlighted in V-2. Develop a working
outline to solve the Problem you identified in V-2. Consider your final Wall project as a
guide.
V-4 From the perspective of your functional architecture drafted in V-3, what significant
items are missing from your work that decrease the capability to make better decisions?
Characterize the risks that must be considered as important to solving the problem you
define.
V-5 Integrate all V- assignments and submit as your Final Project.
V-6 Enhance and extend your e-portfolio.

Homework & Exam Points
V1 [10 points]
V2 [10 points]
V3 [10 points]
V4 [10 points]
V5 [45 points] ~ 39% of total points
V6 [10 points]
Midterm Examination [10 points]
Final Examination [10 points]

Textbook
None assigned.

Assignment Due Dates:

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<thead>
<tr>
<th>Week #</th>
<th>Date Due</th>
<th>Date Name</th>
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<tbody>
<tr>
<td>Week 1 (24 June)</td>
<td>————————</td>
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<tr>
<td>Week 2 (1 July)</td>
<td>5 July</td>
<td>V-1 also should start V-2</td>
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<td>Week 3 (8 July)</td>
<td>————————</td>
<td>also should start V-3</td>
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<tr>
<td>Week 4 (15 July)</td>
<td>19 July</td>
<td>V-2 also should start V-4</td>
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Week 5 (22 July) MIDTERM EXAM
Week 6 (29 July) 2 Aug V-3
Week 7 (5 Aug) ————
Week 8 (12 Aug) 16 Aug V-4
Week 9 (19 Aug) FINAL EXAM
Week 10 (26 Aug) 30 Aug V-5
Week 11 (2 Sep) 7 Sep V-6 e-portfolio

It is my intention to work with you to build your knowledge in Systems Engineering Integration so you have a superior understanding and proficiency. To that end, I will assist you with whatever you need to do to learn the materials. I commit my efforts to your success. Please take advantage of my offer.

Grading Scale

Percentage of allocated points that are normalized to 100 points
A 93+
A- 90-92 B+ 88-89
B 82-87 B- 80-81
C+ 78-79 C 72-77
C- 70-71 D 60-69
F <60

A+ 4.3
Exemplary achievements. Student performance demonstrates professional level command of the course materials and leads in innovating with broad use of Systems Engineering precepts and specifics

A 4.0
Outstanding achievement. Student performance demonstrates full control of the course materials and evinces a high level of originality and/or creativity that far surpasses course expectations

A- 3.75
Excellent achievement. Student performance demonstrates thorough knowledge of the course materials and exceeds course expectations by completing all requirements in a superior manner
B+ 3.5
Very good work. Student performance demonstrates above-average comprehension of the course materials and exceeds course expectations on all tasks as defined in the course syllabus

B 3.0
Good Work. Student performance meets designated course expectations

B- 2.75
Marginal Work

C+/C 2.75/2.0
Unsatisfactory work. Student performance demonstrates incomplete and inadequate understanding of course materials

C-/D+/D/D- 1.75 1.35 1.0 0.75
Unacceptable work.

X 0 Failing.

**Reach Back Policy**

Systems Engineering at Portland State University can better serve its students (users/customers) and student sponsors (customers) through continued communication between graduates and faculty. The intent is to continue dialog after graduation, specifically to encourage:
– Students to maintain contact with professors
– Faculty to remain in contact with graduates
– Faculty to assist students in post-graduate activities
– Faculty to maintain currency with the DoD customer(s) and needs
– Students to keep up with the latest advances in systems engineering

With Kindest Regards, Gary Langford