EMGT 5603—System Thinking and Systems Engineering

Term: Spring 2021 8W2, March 8th – April 29th 2021

Schedule: Online, asynchronous

Instructor:
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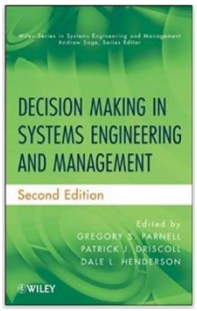
MSEM/MSOM Students:
Welcome to class! There are no specific pre-requisites for this course but be advised we meet the criteria for a Master's in Engineering degree.

Course Description:
The Systems Thinking and Systems Engineering course will explore the role of the Systems Engineering Discipline within a new product development organization and how, when integrated with the data science discipline, can provide the senior leadership team with an interactive decision model to explore strategic options, spot trends, see patterns, and develop intuition regarding system level trade space in the presence of uncertainty.

This course will introduce systems thinking models to facilitate holistic framing of a design decision opportunity, provide best practices for eliciting value schemes from stakeholders, show tips for crafting an objectives hierarchy and associated measures, describe methods for generating creative system level alternatives, share useful modeling and simulation approaches to assess system level alternatives against each measure, and describe how to effectively synthesize data such that relationships can be effectively communicated and decisions made.

Required Textbooks:



Title: Decision Making in Systems Engineering and Management
Author: Gregory S. Parnell (Editor); Patrick J. Driscoll (Editor); Dale L. Henderson (Editor)
ISBN: 978-0-470-92695-6
Publisher: John Wiley & Sons, Incorporated
Publication Date: December 30, 2010

Required Software:

Good news! Your enrollment here at the University of Arkansas entitles you to a free copy of Microsoft Office 365, which includes the entire suite if Microsoft products. You can download your copy of Office at https://techarticles.uark.edu/microsoft/office/.

You will also need:

- Microsoft Office 2016 suite, to include Word, PowerPoint, and Excel.
- Latest versions of Adobe PDF Reader, Adobe Flash Player, and Apple QuickTime to view certain files
- Latest version of Java to use required applications
- Google Chrome is the recommended browser
- **Tableau - Required – Download link in Blackboard**

Course Goals / Objectives:

- Describe the role of the Systems Engineering Discipline within a new product development (NPD) organization.
- Describe the activities involved with framing a systems engineering decision opportunity.
- Explain the best practices for developing objectives and measures.
- Explain the best practices for generating creative alternatives.
- Describe the best practices for assessing alternatives against measures.
- Describe best practices for eliciting value schemes from stakeholders.
- Describe best practices for creating information visualizations to synthesize data & support decisions.
- Describe best practices for assembling and qualifying the system of interest.

Course Requirements:

Description	**Total Points**	**Percent of Grade**
Quizzes	30%	110 points
Project Assignments	25%	90 points
Final Project	45%	150 points
Total	**100%**	**350 points**

Evaluation Procedures:

Grade	Percentage
A	90 – 100%
B	80 – 89%
C	70 – 79%
D	60 – 69%
F	0 – 59%

Attendance Requirements:
This is an asynchronous online course, which means there are no specific attendance hours. You can structure your participation around your work and family obligations. Students are expected to submit weekly quizzes and homework assignments on time and take any proficiency exams within the time window.

If you need to make up work due to unforeseen absences, please contact the professor.
You are welcome to work ahead if you like.

Course Units / Calendar:

Week / Due Date	Topic	Assignments
Week 1 March 11	Lesson 0: Course Overview and Admin Lesson 1: The Systems Engineering Role in Organizations Seeking to Develop Innovative Products	Academic Integrity Quiz Lesson 1 Quiz
Week 2 March 18	Lesson 2: Introduction to the Integrated Systems Engineering Decision Management (ISEDM) Process Lesson 3: Systems Thinking - Perspectives	Lesson 2 Quiz Identify a system for your final project Lesson 3 Quiz
Week 3 March 25	Lesson 4: Systems Thinking - Tools Lesson 5: System Life Cycle Models	Lesson 4 Quiz Create an IDEF0 diagram Lesson 5 Quiz Use a Life Cycle Model
Week 4 April 1	Lesson 6: Framing the Design Decision Opportunity Lesson 7: Capturing the Voice of the Customer, Organizing Requirements, and Creating Measures	Lesson 6 Quiz Frame your SE decision opportunity Lesson 7 Quiz Create an Objectives Hierarchy
Week 5 April 8	Lesson 8: Generating Creative Alternatives Lesson 9: Using Modeling and Simulation to Assess Alternatives Across Measures	Lesson 8 Quiz Generate System Level Alternatives Lesson 9 Quiz Construct an Assessment Flow Diagram
Week 6 April 15	Lesson 10: Synthesizing Data Through the Use of a Multiple Objective Value Model	Lesson 10 Quiz Create Value Functions
Week 7 April 22	Lesson 11: Exploring Available Trade-Space Through Interactive Visualization Dashboard	Lesson 11 Quiz Create Trade-Space Visualizations
Week 8 April 29	Lesson 12: Integration and Qualification	Final Project - Video Presentation

Class Procedures:

This course is fully asynchronous, which means there are no set class hours. Nevertheless, it will be a rigorous introduction to the techniques we cover, and you should expect to prepare for and participate in class. We will make extensive use of technology: Blackboard, videos, and email. With your participation, we will create a vibrant, active online learning environment. Class e-mails will be sent to your uark.edu e-mail address, so please check it regularly. Generally speaking, each week of instruction may offer some combination of instructional materials, quizzes, and homework assignments.

Late Submissions / Flexible Schedule / Time Management: If you keep me informed, I am very flexible on turning in assignments. I know many (if not all) of you are also working and sometimes you need a little extra time. With that said, I highly recommend you complete don't get more than one or two lessons behind as you will run out of time to catch up at the end of the semester.

Office Hours & Help:

Office hours are available by appointment. I have weekend, evening, and daytime appointments available and generally try to accommodate your schedule.

Email is by far the best way to contact me – you can click on the "Email" link on the Blackboard menu and send me an email there. If that doesn't work, you can reach me at schott@uark.edu. If it's time-critical, please do call or text me on my cellphone at (575) 640-6216 anytime; please bear in mind I'm in the Eastern time zone. I also teach full time during the day, and turn my cell phone off when I am in the classroom – so feel free to text!

For technical assistance with Blackboard, contact the Blackboard Support at (479) 575-6804. Refer to the Software & Support tab in Blackboard for more support options.

The Student Development Center (479-575-3546) offers various workshops in test taking, time and stress management, as well as study skills. The Writing Center (479-575-6747) offers assistance in essay and report writing as well as grammar and sentence structure (available for students who have courses on campus). You may also contact the Enhanced Learning Center, which now offers online tutoring for some courses (available to students taking on courses on campus).

Caveat re: Changes to Syllabus

The above schedule and procedures in this course are subject to change at the discretion of the instructor.

Academic Honesty Policy:

- As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail. Each University of Arkansas student is required to be familiar with and abide by the University's 'Academic Integrity Policy' at honesty.uark.edu. Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor.

- Plagiarism is often misunderstood. It can be defined as submitting someone else's work as your own. It is not permissible to "cut and paste" and then just cite another's work. In writing for homework or projects, you should read and learn, process through your mind, relate ideas, and then express what you learned **in your own words**. Cite the references where you found your information. If you do use someone else's words, you must use quotation marks **and** cite. You should not overuse quotes – save them for a rare occurrence.
- A complete statement of the U of A's Academic Honesty Policy is available in the UA Student Handbook and the UA Graduate Catalog.

Inclement Weather Policy:

Weather is unlikely to force cancellation of any online classes or activities. If a known weather event is approaching, it is good practice for students to turn in work early in case of local power outages.

Family Educational Rights and Privacy Act (FERPA)

The Family Educational Rights and Privacy Act (FERPA) protects a student's academic and other educational records from unauthorized access. This protection extends to email correspondence between a student and the University of Arkansas faculty and staff.

To provide reasonable assurance that emails are from the student, all university or class related emails must be sent from the student's uark.edu email account. Additionally, university or class related emails must be sent to the student's uark.edu email account.

This means that I cannot acknowledge emails sent from your personal or work email accounts, and I cannot send emails to your personal or work email accounts.

University of Arkansas Academic Policy Series 1520.10

University of Arkansas Academic Policy Series 1520.10 requires that students with disabilities are provided reasonable accommodations to ensure their equal access to course content. If you have a documented disability and require accommodations, please contact me privately at the beginning of the semester to make arrangements for necessary classroom adjustments. Please note, you must first verify your eligibility for these through the Center for Educational Access (contact 479–575–3104 or visit http://cea.uark.edu for more information on registration procedures).

Academic Appeals

Academic appeals: Students are first encouraged to resolve academic conflicts and complaints informally with the instructor involved, through their department, or through the assistance of the University Ombuds Office, which can provide objective and confidential mediation. To assist students in identifying the appropriate contact person, please view this List of Program, Department, and College Contacts. A flow chart is also available for viewing. If an informal resolution cannot be reached, there are procedures for students to pursue with complaints of an academic nature. Refer to either the Undergraduate Catalog of Studies or the Graduate Catalog of Studies for appeals structures and formal procedures for academic grievances.

Computer Access Policy
This course is offered as an online course and it is assumed that you have the minimum system requirements to participate (see the START HERE section of the course). It is your responsibility to ensure that you can access all course materials, participate in discussions and upload or download materials and software used for this course. In addition, care has been taken to ensure that the software that is used for this course does not require any out of the ordinary system set-ups. But, if your system does not meet the minimum requirements then it is your responsibility to maintain your system to meet the requirements so that you may participate in this course. Technical difficulties on your part will not excuse you from the timely completion of assignments. If you do experience technical difficulties please make sure that you contact me immediately so that proper assistance might be provided.

Netiquette
Netiquette is a set of rules for behaving properly online. It is important that all participants in online courses be aware of proper online behavior and respect each other.

Use appropriate language for an educational environment:

- Use complete sentences.
- Use proper spelling and grammar.
- Avoid idioms and slang.
- Do not use obscene or threatening language.

Remember that the university values diversity and encourages discourse. Be respectful of differences while engaging in online discussions. For more information about Netiquette, see The Core Rules for Netiquette by Virginia Shea.

CAPS
Academic problems are often related to the non-academic events in your lives. You are welcome to visit with the capable staff at the UA Counseling and Psychological Services (with offices in the North Quadrangle). You can telephone them at 479-575-CAPS. The fact that you telephone is also entirely confidential. Each semester they conduct a variety of support groups dealing with stressful issues.

Equal Treatment for All
The UA "Catalog of Studies" reports that the Campus Council supports equal treatment for all. It "does not condone discriminatory treatment of students or staff on the basis of age, disability, ethnic origin, marital status, race, religious commitment, sex, or sexual orientation in any of the activities conducted on this campus. Members of the faculty are requested to be sensitive to this issue when, for example, presenting lecture material, when assigning seating within the classroom, when selecting groups for laboratory experiments, and when assigning student work. The University faculty, administration, and staff are committed to provide an equal educational opportunity to all students."

Our class work will conform to the principle of equal treatment.