

# SYST 542 - 001

## Decision Support Systems Engineering

### Course Description

Spring 2018

Prof. Tom Clemons, PhD  
Department of Systems Engineering and Operations Research  
George Mason University

#### I. Course Overview

Studies design of computerized systems to support individual or organizational decisions. Teaches systems engineering approach to decision support system (DSS) development. DSS is end product of development process, and process is key to successfully integrating DSS into organization. Any DSS is built on a theory (usually implicit) of what makes for successful decision support in given context. Empirical evaluation of specific DSS and the underlying theory should be carried on throughout development process. Course examines prevailing theories of decision support, considers issues in obtaining empirical validation for theory, and discusses empirical support that exists for theories considered. Students design decision support system for semester project.

Prerequisites: SYST 210 – Systems Methodology and Design I, or graduate standing

##### a. Classes

\* **Mondays, from 4:30 p.m. to 7:10 p.m. in Innovation Hall Room 208**

##### b. Office hours

\* Room 2226 of the Nguyen Engineering Building (SEOR Department).

\* Wednesdays 2 – 4 pm, or by appointment.

\* Virtual office hours by appointment.

\* Prof. Clemons contact data: (703) 993-5886 / [tclemons@gmu.edu](mailto:tclemons@gmu.edu).

##### c. Administrative

\* Registration deadline (and last day to drop without penalty): January 29.

\* Final drop deadline (with 66% Tuition Penalty): February 23.

\* Spring Break (no class), Monday Mar 12

#### II. Student Learning Objectives

- a. Understand how decisions can be supported by computerized methods
- b. Understand the types of DSS and the basic functional elements of a DSS
- c. Understand the need for a systems perspective in DSS design, evaluation and development
- d. Solve decision making problems using decision-modeling tools
- e. Analyze a DSS and evaluate its capabilities and if its design
- f. Create a prototype decision support system using the methods learned in the course

### III. Course Schedule

Date	Week	Topics	Assignments * = Reading assignment
1/22	1	Unit 0 - Course Logistics, Unit 1 – Intro to DSS	*Pick-Benefits of DSS *Holsapple – DSS Arch & Types *Keeney – Value Focused Thinking
1/29	2	Unit 2 – Building DSS	Survey due *Marakas – Designing and Building DSS *Marakas – The Systems Perspective
2/5	3	Unit 3-1 – Modeling Decisions Group assignments made	*Clemen – Structuring decisions HW 1 due
2/12	4	Unit 3-2 – Decision Trees	paper titles due *Clemen – Value of Information
2/19	5	Unit 3-3 – Bayesian Networks	HW 2 due *Clemen – Risk Attitudes
2/26	6	Unit 4-1 – Value Model	*Peterson – Utility HW 3 due
3/5	7	Unit 4-2 – Analysis and Optimization Group progress presentation	Project progress report due 3/2 *Liang – Model Management and Solvers
3/12	X	<b>SPRING BREAK – NO CLASS</b>	
3/19	8	Unit 4-3 – Choosing a model Paper review presentations	HW 4 due
3/26	9	Unit 5 – The Data Subsystem Paper review presentations	*Elmars – Fundamentals of Databases *Meredith-Databases and Data Warehouses
4/2	10	Unit 6 – The Dialog Subsystem Paper review presentations	*Hartson – The wheel *Tufte – Visual and Statistical Thinking (p17-31)
4/9	11	Unit 7 – DSS Evaluation Paper review presentations	*Arnot – DSS Failure *Gorman – From Magnum Opus to ... *Rhee – Evaluation of DSS
4/16	12	Unit 8 – Group DSS Project work time	
4/23	13	Group project presentations.	Project report due
4/30	14	Group project presentations.	

## IV. Readings

We use journal articles and excerpts from the texts listed below for the required readings in lieu of a formal textbook. These are accessible on the Blackboard course page under the course content tab. The readings are taken from the below references.

- [Decision Management Systems: A Practical Guide to Using Business Rules and Predictive Analytics](#), 1 edition (October 10, 2011), by James Taylor. IBM Press; 320p. ISBN-10: 0132884380. (This recommended text is freely available for online access via the GMU Library)
- [Handbook on Decision Support Systems, V1, 2](#), F. Burstein and C. Holsapple, Eds., Springer, 2008
- [Decision Support Systems](#), 2nd Edition, by George Marakas, Prentice-Hall, 2003. ISBN-10: 0130922064.
- [Making Hard Decisions](#), 2nd Edition, Robert Clemen, Duxbury, 2001. ISBN-13: 978-0495015086.
- [Understanding Decision Support Systems and Expert Systems](#), by Efreem Mallach, Irwin, 1994. ISBN-10: 0256118965.
- [Value-Focused Thinking: A Path to Creative Decision making](#) (Paperback), Ralph L. Keeney, Harvard University Press, 1996. ISBN-10: 067493198X.
- [Decision Support Systems and Intelligent Systems](#), 8th edition, by Ephraim Turban, Jay Aronson, Ting-Peng Liang, and Ramesh Sharda, Prentice-Hall, 2007. ISBN-10: 0131986600.
- [Decision Support Systems Hyperbook](#), Power, D.J., accessed August, 2006 at <http://dssresources.com>.
- [Spreadsheet Modeling & Decision Analysis](#), 5th Edition, Cliff T. Ragsdale, Thomson; South-Western, 2007. ISBN-10: 0324312504.

**Disclaimer:** the links to amazon.com above were provided solely as a reference to facilitate students in their research (e.g. via the University's library system). Neither the instructor nor GMU is recommending this store.

## Lecture Notes

I will make lecture notes for each chapter available on the Blackboard course page before class. You will need to [download Adobe Acrobat Reader](#) to read these lecture notes.

## V. Course Logistics

1. I will use Blackboard for all course logistics. I expect students to have access and be able to use the system before classes start. Blackboard is accessible via the MyMason portal at <https://mymasonportal.gmu.edu/>. The “resources” link at the bottom of the portal page provide instructions for using the Blackboard system.
2. Failure to access the system due to lack of knowledge on Blackboard is not an excuse for missing classes, late assignments, or failing course deliverables.
3. I will only communicate with you through GMU email. Be sure to check it often.
4. Volgenau School Computing Resources has answers to many questions about school systems on their web site: <http://labs.vse.gmu.edu> and will try to help you if have problems connecting to school computing systems. However, they will not provide assistance with general computing questions or course assignments. If you have any questions about how to use software to complete your assignments, please refer to the following document: <http://labs.vse.gmu.edu/uploads/FacultyFAQ/StudentWelcome.pdf>  
  
Other resources that you may find helpful may be found at: <http://ctfe.gmu.edu/teaching/student-support-resources-on-campus/>
5. Accommodations for disability: If you have a documented learning disability or other condition that may affect academic performance you should:
  - a. make sure this documentation is on file with Office of Disability Services (SUB I, Rm. 4205; 993-2474; <http://ods.gmu.edu>) to determine the accommodations you need; and
  - b. talk to me to discuss your accommodation needs.
6. Inclement weather: Check the Announcements area for the course for updates.

## Expected Behavior

1. Class attendance is essential. Information will be presented that will not necessarily be in the book, and is certain to be needed in course assignments.
2. Regarding electronic devices (such as laptops, cell phones, etc.), please be respectful of your peers and your instructor and do not engage in activities that are unrelated to class. Such disruptions show a lack of professionalism and may affect your participation grade.
3. Students are encouraged to interact on homework assignments, but your write-up must be your own. Assignments provide practical, hands-on experience with the ideas presented in the course.

4. Changes to assignment dates and scheduling provided below are possible. I will post changes to Blackboard through email. It is the students' responsibility to keep abreast of any changes. Students must check their GMU email messages on a daily basis for course announcements, which may include reminders, revisions, and updates.
5. Students will submit all course deliverables electronically. I have already provided the schedule for these deliverables in this syllabus. That said, there is some flexibility for students to request changes, but you must make these requests well in advance. Should any scheduled event affect a student's participation in class activities and assignments, it is the student's responsibility to coordinate with me prior to the event.
6. Religious observances are one common example of events that might affect students' activities. Students are responsible for planning ahead. Please, refer to the GMU's calendar of religious holidays at <https://ulife.gmu.edu/calendar/religious-holiday-calendar>
7. Late assignments, when properly justified, will receive reduced credit in accordance with the late assignment policy (below in this document). I will reward no points for homework turned in after I have posted solutions.
8. Academic Policy: Students must strictly follow all academic policies as given in the Honor System and code. These are available at <http://catalog.gmu.edu/policies/academic/>
9. General Policies: All general policies defined in the University Catalog are in place for this course. You can access those at <http://catalog.gmu.edu/policies/general-policies/>
10. It is essential to communicate any questions or problems to me promptly.

### **Academic Integrity**

George Mason University is an Honor Code university. Please see the Office of Academic Integrity website (<http://oai.gmu.edu/the-mason-honor-code-2/>) for a full description of the honor code and the honor committee process.

Graduate work is often best completed in a collaborative manner. Active discussion and support between students is encouraged. You will be assigned to a project group for the course's final assignment. This collaborative project may be divided up so that individual group members complete portions of the whole, provided that group members take sufficient steps to ensure that the pieces conceptually fit together in the end product. Other assignments are designed to be completed independently. For these assignments, you are encouraged to discuss your ideas with others and conference with peers on drafts of the work and to incorporate the results of those discussions in the work; however, the final product you submit must be your own individual work.

## VI. Assignments

### a. Grading

The grading structure of this course is as follows:

- Assignments, including homework and class quizzes (20% of grade)
- Final Exam (25% of grade)
- Group Project (30% of grade)
- Paper Review Presentation (25% of grade)

Always check for grades on Blackboard. If you don't see the grade, report to me by the next class after assignments have been returned. I will not entertain missing grade requests that come later in the semester.

### b. Homework

There will be assignments posted via Blackboard during the course. Each assignment will have its respective due date defined during the announcement. Due dates of homework in this syllabus are approximate. Refer to the due date in the blackboard assignment for the most accurate.

Assignments **must be submitted via Blackboard** and can be of three types:

- **Homework:** Each homework assignment is worth 100 points. Unless stated otherwise, I will present the solutions at the beginning of the next class after the assignment was handed. If you submit your assignment after it is due but before I present the solutions you can earn a max of 70 points. An assignment handed after the solutions are posted will yield 0 points.
- **Quizzes, or Challenges:** These are conducted in class and each will be out for an amount of points to be disclosed prior to the class. The details of each quiz, or challenge will be explained during its respective announcement.

**File naming convention:** Please use the following format when naming your files submitted via blackboard. Submit homework as pdf or word documents **ONLY**, unless I state otherwise in the assignment.

*Syst542\_AssignmentTypeAndWeek\_LastnameFirstname.pdf*  
Example: Syst542\_Hwk2\_DoeJohn.pdf

### c. Paper Review

Teams of 2 students will be assigned by the second week of class to perform an assessment of a DSS article from either a peer-reviewed conference, or an academic journal from the *last 10 years*. Teams will present their respective assessment and conclusions to the class via a 15 min oral presentation followed by a 5-min questioning session.

**Oral presentation.** One member of the team must upload their slides to the Blackboard system no later than 2 p.m. Eastern Time **of the day before** their presentation. Minor changes to the slides after submission are allowed, but the submitted version must be very close to the actual presentation. All students are expected to read the abstracts and view the slides prior to each presentation.

However, those really interested in maximizing their learning experience are advised to read the actual paper before the presentation and fully use their participation rights at the questioning session.

Students are strongly advised to go beyond a mere description and exercise their critical side. Special attention should be given to a proper support for each critique, being it positive or not. As an example, “his idea of automating the data collection process is awful ... because I don’t think it would work” is a common instance of an “empty” evaluation. In this case, the reviewers should have supported their assessment with either facts (e.g. “this has been tried in system so-and-so and achieved such-and-such results) or references (e.g. “Smart, Maxwell; *et al.*, 1965, proved this approach to be sub-optimal”). You will be evaluated on your ability to provide a thoughtful and well-supported review.

#### d. Group Project

**Overview.** During the second week of class I will divide the class into several groups of 3-5 people for the group project. A survey of interests will help me determine balanced groups. Each group will design and implement a DSS for a problem of their choice. Groups may meet in person or via virtual sessions as often as necessary and are encouraged to interact between meetings. The problem you choose is entirely up to you.

**Progress report.** Groups will provide one 5-page written progress report during the course and present it in class. The intent of this report is to provide me with an update on each group progress as well as with a means to support each group in succeeding with their goals. The progress report and its presentation account for 5% of the Group’s final project grade.

The progress report must be submitted via Blackboard by **Friday, 3/2**, noon eastern time. This report should include brief descriptions of:

- The DSS Concept;
- User requirements; and
- Project management plan.
- Description of the model, dialogue and data subsystems;
- Implementation plan (what will be implemented in your prototype); and
- Evaluation plan (how will you evaluate your prototype).

A progress report presentation will be given in class on **Monday, 3/5** (week 7). Details regarding this presentation will be provided closer to the event.

**Group Project Oral presentations.** Each group will have 23 minutes to present their work, including at least 5 minutes for questions. One member of the group must submit slides via Blackboard no later than 2 p.m., Eastern Time, **of the day of the presentation!**

All group members are expected *to present* and *to be available for questioning*. The final presentation must include a live demonstration of a DSS prototype and will count towards your final grade. Usually, DSS prototypes were based on an Excel model implementing some of the techniques learned in the course to solve the

problem chosen by the group. There have been groups in the past using more sophisticated approaches, such as a Python or a Java-based front end to an Excel model. Although polished and sophisticated prototypes are welcomed, the minimum requirement is only an Excel-based implementation of a DSS.

**Group Project Final report.** A 10-15 pages written report is due at **4pm of the first day of presentations (anticipated date 4/23)**. One group member will submit the report via the Blackboard system. The cover page, table of contents, bibliography section nor the appendices count towards the page limit.

**Grading.** Groups may select any implementation environment they judge appropriate for their respective problem. The Group Project grading is structured as follows:

- Progress report (5%);
- Oral presentation and demo (50%); and
- Final report (45%).

**Peer Evaluation:** *Your grade on this project will be strongly affected by your peer evaluations and my own observations on your level of participation and performance*

You are expected to rate each person of your team – not including you - on a 10-point scale. The rating scale is as follows:

- **9-10** Participated enthusiastically, exhibited strong leadership, attended regularly and was essential to meetings, performed tasks responsibly and on time, work was extremely high quality, took excellent initiative and was highly self-motivated;
- **8-9** Good participation, attended and contributed to meetings, exhibited leadership, performed tasks responsibly and on time, work of dependable high quality, took good initiative and was self-motivated;
- **7-8** Adequate participation, usually attended and contributed to meetings, exhibited some leadership, performed tasks responsibly and usually on time, work of dependable good quality, took reasonable initiative and was reasonably self-motivated;
- **5-7** Participation could have been better, performed tasks when asked but may have been late and/or needed reminders, quality could have been better, needed guidance and usually did not take enough initiative;
- **5 or lower** Participation was minimal or non-existent; any work that was turned in was of inadequate quality.

#### **e. Final Exam**

The Final Exam will be a take home exam provided near the end of the term. The exam will cover material from the entire semester.

This is a very dynamic and intensive course.  
Exercise planning, be proactive and do your best to  
stay ahead of schedule.