

SYST 542

Decision Support Systems Engineering

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Course Description

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This course studies the design of computerized systems to support individual or organizational decisions. The course teaches a systems engineering approach to the decision support system (DSS) lifecycle process. This course studies factors leading to effective computerized support for decisions, characteristics of tasks amenable to computerized support, basic functional elements of a decision support system, the decision support lifecycle, and factors leading to successful integration of a DSS into an organization. Additional topics include support for multi-person decisions, support for distributed decision processes, support for time-critical decisions, and how to refine and improve an organization's DSS development capability. A DSS is built on a theory (usually implicit) of what makes for successful decision support in the given context. Empirical evaluation of the specific DSS and underlying theory should be carried on throughout the development process. The course examines some prevailing theories of decision support, considers the issues involved in obtaining empirical validation for a theory, and discusses what if any empirical support exists for the theories considered. Students design a DSS for a semester project.

Course Outline:

Class Details

Prerequisites

* *SYST 301 or graduate standing.*

Classes

* *Room 131 of the Innovation Hall.*

* *Thursdays, from 4:30 p.m. to 8:30 p.m.*

Office hours

- * *Room 2227 of the Engineering Building.*
- * *Thursday, from 3 p.m. to 4 p.m., or by appointment.*

Logistics and Expected Behavior

All communication, file exchanges, submissions must be done using the Blackboard System! Yet, you are welcomed to use my email directly as a backup or to address aspects not related with the course content.

Summer classes have a long duration. In general, I'll be aiming for at least two 10 min break. However, you are allowed to enter or leave at any time, provided you do your best to avoid disrupting the activity going on.

Please make sure you have your cell phone, pagers, pda, etc., in silent mode. Should you see yourself in extreme need to answer an incoming call, just leave the room to do so.

This is a very dynamic and intensive course, in which you will have a great and enjoyable opportunity to learn by doing and interacting with your peers. To succeed, you must exercise planning, be proactive and do your best to stay ahead of schedule.

Textbook

Most of the material in this course is based on the following text:

- [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.

However, this is a graduate course in which different aspects of DSS are going to be explored and the ability to conduct independent research is expected. Therefore, students are encouraged to also refer to the following resources when performing their assignments:

- [Decison Support Systems](#), 2nd Edition, by George Marakas, Prentice-Hall, 2003. ISBN-10: 0130922064.
- [Making Hard Decisions](#), 2nd Edition, Robert Clemen, Duxbury, 1997. ISBN-10: 0534260349.

- [Value-Focused Thinking: A Path to Creative Decisionmaking](#) (Paperback), Ralph L. Keeney, Harvard University Press, 1996. ISBN-10: 067493198X.
- Decision Support Systems Hyperbook, Power, D.J., accessed August, 2006 at <http://dsresources.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 is recommending this store nor the books are required for this course.

Lecture Notes

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

Grading

The grading structure of this course is as follows:

- Group Project (45% of grade)
- Weekly Discussion question (30% of grade)
- Facilitating and reporting on a Weekly Discussion question (5% of grade)
- Paper Review (20% of grade)

Group Project

Overview. Students will be divided in small groups during the first class. Each group will design and implement a DSS for a problem of their choice. Group assignments will be made by the second week of classes. Groups may meet in person as often as necessary and are encouraged to interact virtually between meetings. The problem you choose is entirely up to you.

Progress reports. Groups should provide two 3-page written progress reports during the course. The first progress report, due Thursday, 6/25, 11:59 p.m. eastern time, should include:

- Description of the DSS Concept;
- User requirements (draft); and
- Project management plan.

The second progress report, due Thursday, 7/02, 11:59 p.m. eastern time, should include:

- 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).

Oral presentations. Each group will have 30 minutes to present their work, while at least 5 minutes will be reserved for questions. Slides must be submitted via Blackboard no later than 2 p.m., Eastern Time, of the day before the presentation! It is tolerable to make changes to your presentation after submitting it, although you are expected to handle a reasonably “close-to-final” version of the actual presentation.

All group components are expected *to present* and *to be available for questioning*. A demo of your prototype is required and will count towards your final grade, but you must ensure that all aspects of your project are evenly represented.

Final report. A 10-15 pages written report is due on Monday 7/27, 11:59 p.m. Eastern Time. It should be submitted via the Blackboard system, which will have a suggested outline available to students. Neither the bibliography section nor the appendices count towards the page limit.

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

- Two progress reports (5% each);
- Oral presentation and demo (40%); and
- Final report (50%).

Individual Grading. Your grade on this project will be partly a group grade and partly an individual grade based on your self and peer evaluations. Your team should rate each person on a 10-point scale. The rating scale is as follows:

- **10 (A)** 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;
- **9 (A-)** 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;
- **8 (B)** 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;

- **7 or 6 (B-)** 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 below (F)** Participation was minimal or non-existent; any work that was turned in was of inadequate quality.

Your evaluations should reflect a consensus of your group. A suggested process to follow is for each person to rate all group members (including him or herself) anonymously, and then collate the ratings and discuss them among you. I am available to mediate any serious conflicts. If your group cannot reach consensus, I will listen to all sides and make my own evaluation, but there will be a penalty to your grade for not reaching consensus. There is no penalty for asking my advice or requesting that I serve as a mediator. The only penalty is if you cannot ultimately resolve the conflict on your own.

If the evaluations are not included in the final report, all team members will receive equal group grades, and there will be a penalty for not including a required part of the report.

Weekly Discussion

Each week (with occasional weeks off) a discussion question will be posed to the class for asynchronous electronic discussion prior to the next class. Discussion questions are based on a common theme and cumulatively lead to a collaboratively developed case study. The overall discussion process includes an open discussion and a written response. The Blackboard System's resources must be used during all phases of the process.

- **Logistics:** The discussion question will be posted by noon the day after class and will be based on issues raised during the previous class. As soon as the discussion question is posted it starts the open discussion process, which involves two distinct phases: a forum debate and an in-class debate. Each student is required to post at least one comment to the group forum during the forum debate phase.
- **Grading Criteria for the Weekly Discussion:** Each student will receive his or her grade by email during the week following submission. The grading structure is as follows:
 - Open discussion (60%), divided as:
 - Half for the forum debate (that is, 30% of the total), and
 - Half for the in-class debate (that is, the remaining 30%);

- Final response (40%).
- **Open discussion:** It is composed by two phases, the forum debate and the moderated in-class debate. All students will receive an overall open discussion grade for their respective contributions to both the forum debate and the in-class debate.
 - **Forum debate.** It will be conveyed via the Blackboard system, starting as soon as the discussion question is posted and ending at 12:00 PM EST of the following Tuesday. In the event that Blackboard is down at the time of the deadline for posting for open discussion, you may email the class list and post your discussion later. Participation in the forum accounts for half of the overall To receive full participation grade on this phase, you must submit a post to the forum that has non-trivial contribution: For example, "I agree with Joe Average," does not count as a meaningful participation. However, a brief summary of Joe's position, how it contrasts with the positions given by other students, and your reasons for agreeing with Mary, will receive full participation grade for this phase.
 - **Moderated in-class debate:** The facilitating group assigned to that weekly discussion will be responsible for moderating the discussion as well as providing a report on the overall discussion process. The facilitating group should coordinate the debate and make sure that it takes no more than 30 minutes of class time. Your performance on the in-class debate accounts for 50% of the Open Discussion grade and the same rationale for defining a valid participation in the forum debate applies to the in-class debate.
- **Written response:** Each student must submit a written response to the instructor by 7:00PM EST on the Friday after the class in which the discussion occurs. Your grade in this written response accounts for 40% of the overall Weekly Discussion grade. With possible exceptions as noted by the instructor, it *must be less than one typed page*. In some cases, a graphic may be appropriate. If so, you can embed the graphic in your document or attach a separate image file. There should be no more than one page of graphics. Your response may draw on any points made during open discussion. It must be a self-contained response to the discussion question, written in your own words.
 - **Written response submission:** It should be uploaded via Blackboard or, in case of unavailability of it, sent by email to the instructor. The file name should be DQ_ and your name must be on every page of the document. Emails should have the header DQ : Final response. I will set my filter to send these to a discussion question folder. If you don't type the correct header, I may miss your response. For example, if your email name is jsmith3 and you are responding to discussion question 2, you would type:

- Subject: DQ2_jsmith3: Final response

Facilitating and reporting on a weekly discussion

For each weekly discussion, a team of two or three students will be responsible for the facilitation and the reporting of that specific process. The grading is structured as follows:

- Facilitating the open discussion: 60% of the grade.
- Documenting the process: 40% of the grade.

That is, the group will receive a grade based on both their ability to facilitate the discussion and their respective report of the discussion process. The assignment for the facilitating teams will be performed during the first day of classes, and the first facilitating will start their job the next day (i.e. as soon as the discussion question is posted).

The role of the moderator is to lead the class in a productive discussion of the issue raised in the week's question. We will be collaboratively developing an operational concept for the case study DSS we have selected and laying out key elements of a preliminary design. The objective each week will be to come to consensus on some aspect of our design. For example, our objective the first week is to agree upon the stakeholders, the decisions to be supported, how the DSS will be used, and our approach to obtaining requirements.

Typically, the discussion leader / facilitator will begin by presenting a brief summary of the main ideas raised in the initial discussion. If there are disagreements or issues that need clarification, these should be pointed out. Then the discussion leader will engage the class in debating any issues on which there is disagreement, trying to work toward consensus. An important role for the moderator is to keep the discussion from wandering off-topic. The moderator will also try to give everyone a chance to speak. Remember: the moderator, not the instructor, is leading the discussion!

At the end of the discussion, the moderator will summarize the key points covered during the discussion, summarize what has been agreed upon, and state any remaining areas of disagreement. Each facilitating team, usually a team member assigned as scribe, will have to record the main points made during the discussion, to note the key areas of agreement and disagreement, and to post the notes after the discussion in the discussion section of Blackboard. The team is supposed to post their respective notes no later than two hours after the class, so that students in formulating their final responses to the discussion question will be able to use these notes.

Each facilitating team is free to define their respective modus operandi and work breakdown structure. It should be noted from previous experiences that a minimal planning and task assignment effort drastically improved the performance of the team and the quality of the discussion process as a whole. Likewise, teams that just operated as independent facilitators without a pre-defined strategy consistently led to below average discussions.

Paper Review

By the second week of class, each student will choose a DSS article from either a peer-reviewed conference or an academic journal. Students are expected to write a review of the paper and present his/her respective assessment and conclusions to the class via 15 min oral presentation followed by a 5-min questioning session. The Paper Review grading is structured as follows:

- Written review report: 60% of the grade.
- Oral presentation: 40% of the grade.

Oral presentation. The presenter must upload his slides to the Blackboard system no later than 2 p.m. Eastern Time of the day before his/her 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.

Written review report. Ideally, it should have a length of 4 to 5 pages, while 8 pages is the actual limit. Students are expected to submit the report one week after their respective presentations, by 11:59 p.m. Eastern Time. They are strongly advised to go beyond a mere description and exercise their critical side, and 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 awfull ... because I don't think it would work" is a common instance of an empty evaluation. In this case, the reviewer should have supported his 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").

Fairfax, May 20, 2009.