

**IE 4345: Applied Knowledge Engineering and Data Analytic Applications
(Decision Analysis in System Design)
Spring 2016**

Instructor:

Dr. Paul Componation

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Office Hours:

Instructor – Monday and Wednesday, 9:00 – 11:00 am (other times by appointment)

Graduate Teaching Assistant (GTA) hours - will be identified by the end of the second week of class.

Time and Place of Class Meetings:

Tuesday and Thursday, 12:30 pm – 1:50 pm, Nedderman Hall Room 109

Description of Course Content:

Application of decision theory principles and tools to evaluate alternative hardware/software system architectures based on technical design requirements such as mass, reliability, power and life cycle costs.

Systems engineering trade study approaches are presented with applications in defense, aerospace, energy and related areas. Methods for dealing with technical data risk and uncertainty are presented.

Prerequisite: Accepted in an UTA engineering professional program.

Student Learning Outcomes:

1. To introduce students to the concepts of decision analysis
2. To educate students in the trade study method
3. To train students to use the trade study method to support the design of complex systems
4. To train students on how to customize the trade study method to help solve unique problems

Required Textbooks and Other Course Materials:

Goodwin and Wright, Decision Analysis for Management Judgment, 5th ed., Wiley, 2014.

ISBN: 978-1-118-74073-6

Course Website:

Blackboard (<http://elearn.uta.edu>)

Distance Education:

NA

Blackboard Help:

Richard Zercher (zercher@uta.edu)

Grading:

Points per grade: A \geq 90, B \geq 80, C \geq 70, D \geq 60, F < 60.

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| Exams (3) | 60 points |
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| Team/Individual Project | 30 points |
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| Class Exercises (5) | 10 points |
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| Total | 100 points |
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Course Schedule:

| Week | Date | Session | Topics | Notes |
|------|------|---------|---|---------------------------------|
| 1 | 1/19 | 1 | Course Overview | |
| | 1/21 | 2 | Dealing with Complex Decisions | pp. 1-13 |
| 2 | 1/26 | 3 | Trade Study – Medial Waste | |
| | 1/28 | 4 | How People Make Decisions | pp. 15-30 |
| 3 | 2/2 | 5 | Objectives | |
| | 2/4 | 6 | Alternatives | |
| 4 | 2/9 | 7 | Models | |
| | 2/11 | 8 | Analysis | |
| 5 | 2/16 | 9 | Sensitivity | |
| | 2/18 | 10 | Trade Study – ISS Propulsion Module | |
| 6 | 2/23 | 11 | Review | |
| | 2/25 | 12 | Exam 1 | |
| 7 | 3/1 | 13 | SMART | pp. 33-58 |
| | 3/3 | 14 | SMART | P1-Objectives |
| 8 | 3/8 | 15 | Decision Making Under Uncertainty | pp. 117- 152 |
| | 3/10 | 16 | Decision Making Under Uncertainty | P2-Alternatives |
| | 3/15 | | Spring Vacation | |
| | 3/17 | | Spring Vacation | |
| 9 | 3/22 | 17 | Decision Trees and Influence Diagrams | pp. 161-179 |
| | 3/24 | 18 | Decision Trees and Influence Diagrams | P3-Model |
| 10 | 3/29 | 19 | Bayes' Theorem | pp. 95-112, 221-227 |
| | 3/31 | 20 | Revising Judgments with New Information | pp. 227-240; P4-Analysis |
| 11 | 4/5 | 21 | Resource Allocation and Negotiations | pp. 350-355 |
| | 4/7 | 22 | Resource Allocation and Negotiations | P5-Sensitivity |
| 12 | 4/12 | 23 | Review | |
| | 4/14 | 24 | Exam 2 | |
| 13 | 4/19 | 25 | Decision Framing and Cognitive Inertia | pp. 361-382 |
| | 4/21 | 26 | Cognitive Work | P6-Report |
| 14 | 4/26 | 27 | Cognitive Work | |
| | 4/28 | 28 | Heuristics and Biases | pp. 245-268 |
| 15 | 5/3 | 29 | Makeup Day | |
| | 5/5 | 30 | Review | |
| | 5/12 | 31 | Final Exam 11:00 am – 1:30 pm | |

Descriptions of Exams and Assignments: The course grade will be based on total points earned.

- The exams are closed book and closed notes. They are comprehensive. Exams are taken in class.
- The project may be done individually or as a team. The project components are submitted on-line.
- Class exercises are closed book and closed notes. They are comprehensive and unannounced. They may not be made up if missed.
- There is a makeup day when a single missed exam may be rescheduled.

Attendance: Attendance is not taken in class.

Other Requirements: Please go outside the class if you have a call you need to take. Students who come to class late and once class has already started should try to enter the classroom as discreetly as possible. Please be courteous to the instructor and your fellow classmates.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Title IX: The University of Texas at Arlington is committed to upholding U.S. Federal Law "Title IX" such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit www.uta.edu/titleIX.

Academic Integrity: Students enrolled in this course must adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through

MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is accessible by leaving from the classroom door and down the stairwell closest to the door. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist handicapped individuals.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

Emergency Phone Numbers: On-campus Emergency, call the UT Arlington Police Department at 817-272-3003 (non-campus phone) or 2-3003 (UT Arlington campus phone). You may also dial 911

Inclement Weather Policy: If the University is closed, this class will not meet. Any scheduled exam will be rescheduled to the next class period that the class meets. Students can get information about closures by checking the main website at www.uta.edu.

Note: The instructor for this course reserves the right to adjust the course schedule in any way that serves the educational needs of the students enrolled in this course. Any changes will be discussed in class and an updated syllabus will post in Blackboard. Students must stay aware of and comply with any changes once notified by the instructor.