Course Syllabus

Course Information

Course Number: OPRE 6398.001/BUAN 6398.001
Course Title: Prescriptive Analytics
Term: Fall 2016

Professor Contact Information

Professor: Ching-Chung Kuo
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Office Hours: T, R, F 1:00 p.m. - 3:00 p.m.

About the Instructor

Ching-Chung Kuo is a Clinical Professor and the Director of the Undergraduate Supply Chain Management Program in the Operations Management Area of the Jindal School of Management at the University of Texas at Dallas. He received his Ph.D. in Industrial Engineering and Management Sciences from Northwestern University.

TA Contact Information

Teaching Assistant: Mazen Lababidi
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Office Hours: M 3:00 p.m. - 5:00 p.m.

Course Pre-requisites, Co-requisites, and/or Other Restrictions

Pre-requisite: OPRE 6301 Quantitative Introduction to Risk and Uncertainty in Business

Course Description

"OPRE 6398 Prescriptive Analytics (3 semester hours): Introduction to decision analysis and optimization techniques. Topics include linear programming, decision analysis, integer programming, and other optimization models. Applications of these models to business problems will be emphasized. (3-0) S"

The course is about the science of better, i.e., applying analytical tools to make better decisions and improve the efficiency of a system. Topics to be covered include linear programming, integer programming, network models, time series forecasting, queuing theory, decision analysis, and project management. The primary goal is to acquaint students in business and relevant disciplines with useful concepts, theories, and solution methods in predictive analytics. Much emphasis will be placed on practical applications of the models discussed in class.

Student Learning Objectives/Outcomes

Students are expected to become familiar with the Excel-based software required for the class and develop skills in formulating problems, identifying solution methods, solving problems manually or by computer, and interpreting results. Upon successful completion of this course, students should be able to:

1.   Use Analytic Solver Platform proficiently;

2.   Formulate real-world problems as analytical or optimization models;

3.   Identify appropriate program(s) in Analytic Solver Platform for solving models formulated;

4.   Apply programs identified to solve problems manually or by computer; and

5.   Interpret results obtained and implement them in practice.

Required Textbooks and Materials

Textbook:

Ragsdale, C. T. (2015). *Spreadsheet modeling & decision analysis: A practical introduction to business analytics (7th ed.)*. Stamford, CT: Cengage Learning. (ISBN-10: 1-285-41868-9; ISBN-13: 978-1-285-41868-1)

The textbook listed above is required for this course. The student is fully responsible for the possible consequences caused by using other editions of it as their contents might be different from those in the latest edition.

Software:

The main computer software to be used in this course, Analytic Solver Platform, is an Excel add-in and it will be run on a Windows-based laptop with Microsoft Excel 2007 or higher (no trial versions).

Assignments and Academic Calendar

08/23/16   Syllabus Review

                  Chapter 1: Introduction to Modeling and Decision Analysis

08/25/16   Chapter 2: Introduction to Optimization and Linear Programming

08/30/16   Chapter 2: Introduction to Optimization and Linear Programming

09/01/16   Chapter 3: Modeling and Solving LP Problems in a Spreadsheet

                  Reading 1: Yoshino, T., Sasaki, T., & Hasegawa, T. The traffic-control system on the Hanshin Expressway. *Interfaces*, 1995, January-February, pp. 94-108 (abstract).

09/06/16   Chapter 3: Modeling and Solving LP Problems in a Spreadsheet

                  Reading 2: Makuch, W., Dodge, J., Ecker, J., Granfors, D., & Hahn, G. Managing consumer credit delinquency in the US economy: A multi-billion dollar management science application. *Interfaces*, 1992, January-February, pp. 90-109 (abstract).

09/08/16	Chapter 4: Sensitivity Analysis and the Simplex Method
	Reading 3: Cabraal, R. A. Production planning in a Sri Lanka coconut mill using parametric linear programming. *Interfaces*, 1981, June, 16-23 (abstract).
09/13/16	Chapter 4: Sensitivity Analysis and the Simplex Method
	Reading 4: Carino, H. F., & LeNoir, C. H. Optimizing wood procurement in cabinet manufacturing. *Interfaces*, 1988, March-April, 10-19 (abstract).
09/15/18	Chapter 4: Sensitivity Analysis and the Simplex Method
09/20/16	**Examination I**
09/22/16	Chapter 6: Integer Linear Programming
	Reading 5: Subramanian, R., Scheff, R., Jr., Quillinan, J., Wiper, D., and Marsten, R. Coldstart: Fleet assignment at Delta Air Lines. *Interfaces*, 1994, January-February, 104-120 (abstract).
09/27/16	Chapter 6: Integer Linear Programming
	Reading 6: Hoadley, B., Katz, P., & Sadrian, A. Improving the utility of the Bellcore consortium. *Interfaces*, 1993, January-February, 27-43 (abstract).
09/29/16	Chapter 6: Integer Linear Programming
10/04/16	Chapter 5: Network Modeling
	Reading 7: Braklow, J., Graham, W., Hassler, S., Peck, K., & Powell, W. Interactive optimization improves service and performance for Yellow Freight System. *Interfaces*, 1992, January-February, 147-172 (abstract).
10/06/16	Chapter 5: Network Modeling
	Reading 8: Jack, C., Kai, S.-R., & Shulman, A. NETCAP--An interactive optimization system for GTE telephone network planning. *Interfaces*, 1992, January-February, 72-89 (abstract).
10/11/16	Chapter 5: Network Modeling
10/13/16	**Examination II**
10/18/16	Chapter 11: Time Series Forecasting
	Reading 9: Blank, D. Meal shortfalls still gnaw at some airlines. *USA Today*, 2000, February 22, 5B (abstract).
10/20/16	Chapter 11: Time Series Forecasting
	Reading 10: Andrews, B. H., & Cunningham, S. M. L. L. Bean improves call-center forecasting. *Interfaces*, 1995, November-December, 1-13 (abstract).
10/25/16	Chapter 11: Time Series Forecasting
10/27/16	Chapter 13: Queuing Theory

Reading 11: Swersey, A., Goldring, L., & Geyer, E., Sr. Improving fire department productivity: Merging fire and emergency medical units in New Haven. *Interfaces*, 1993, January-February, 109-129 (abstract).

11/01/16	Chapter 13: Queuing Theory

Reading 12: Larson, R., Cahn, M., & Shell, M. Improving the New York City arrest-to-arraignment system. *Interfaces*, 1993, January-February, 76-96 (abstract).

11/03/16   Chapter 13: Queuing Theory

11/08/16   Chapter 14: Decision Analysis

Reading 13: Cohan, D., Haas, S., Radloff, D., & Yancik, R. Using fire in forest management: Decision making under uncertainty. *Interfaces*, 1984, September-October, 8-19 (abstract).

11/10/16   **Examination III**

11/15/16   Chapter 14: Decision Analysis

Reading 14: Smith, B., Leimkuhler, J., & Darrow, R. Yield management at American Airlines. *Interfaces*, 1992, January-February, pp. 8-31 (abstract).

11/17/16   Chapter 14: Decision Analysis

11/22/16   **Fall Break (no class)**

11/24/16   **Thanksgiving Day (no class)**

11/29/16   Chapter 15: Project Management

Reading 15: O'Keeffe, S. W. T. Chrysler and Artemis: Striking back with the Viper. *Industrial Engineering*, 1994, December, pp. 15, 17 (abstract).

12/01/16   Chapter 15: Project Management

Reading 16: Wood, L. Perfect harmony. *Informationweek*, 1995, May 8, pp. 42-54 (abstract).

12/06/16   Chapter 15: Project Management

12/08/16   **Reading Day (no class on)**

12/13/16   **Examination IV**

Grading Policy

Grading Criteria:

Homework Assignments	20%
Examination I	20%
Examination II	20%
Examination III	20%
Examination IV	20%

Grading Scale:

90 or above	A
87 - 89	B$^+$
80 - 86	B
77 - 79	C$^+$
70 - 76	C
Below 70	F

Course and Instructor Policies

Homework Assignments:

Five to six students will form a team in the first class meeting and they are collectively responsible for 11 homework assignments during the semester. However, only the best 10 scores will count towards the course grade. Each team has to submit a hard copy of the homework solutions at the beginning of the class on the due date of each assignment. No late submissions will be accepted.

All homework solutions must be typewritten in a regular font of your choice of size 10 - 12 points on 8 ½ x 11 white paper. Computer outputs should be properly pasted at the appropriate places. All charts plotted manually should be prepared with a ruler on graph paper and they should be attached at the end. Moreover, the course number, the course title, the homework number, the team number, and the names of the team members must be clearly indicated on the cover page. Finally, no collaborations with other teams are allowed. Points will be deducted for any deviations from these guidelines.

A student's grade on homework will be subject to peer evaluations at the end of the semester. Suppose, for example, that your team's average score on the assignments submitted is 95% and you receive an average evaluation of 96% from your teammates and yourself. Then your overall score for the homework assignments will be 95% x 96% = 91.2%. Please refer to Page 8 for a sample completed peer evaluation form.

In case a member does not perform to the team's expectation in homework assignments by constantly missing group meetings, failing to provide requested information in a timely fashion, contributing work that is poorly done, or exhibiting other unprofessional behaviors, the other members may decide to drop him/her from the group. However, in the interest of fairness, the five-step procedure outlined below must be closely followed:

(1) There needs to be a unanimous agreement among all other team members that the student's performance is unsatisfactory.

(2) The concern must be conveyed to the person in writing and discussed with him/her in person. The written notice must be signed and dated by the rest of the group.

(3) A copy of the above-mentioned notice has to be submitted to the instructor at the same time.

(4) The student has two weeks of class time to improve his/her performance.

(5) If no unsatisfactory improvement is made over the two-week period, then a final written notice of dropping the person as a member of the team will be signed and dated by the other members and given to him/her. In the meanwhile, a copy of the document must be forwarded to the instructor.

If a student is dropped from a team and not accepted by another, then he/she must complete the remaining assignments on an individual basis or loses the homework points. Notice that no team members can be dropped after Examination II.

Examinations:

There will be four noncumulative, closed-book, and closed-notes examinations given in class during the semester. The types of questions to be asked in the test include, but are not limited to, multiple-choice, fill-in-the-blank, short-answer, model formulation, analysis of computer input/output, and computational.

No make-up examination will be given unless prior arrangements have been made with the instructor or there is documented evidence of an extreme circumstance causing the delay or absence (e.g., verifiable medical or family emergencies) and it is provided to the instructor at the earliest possible time. Only pens, pencils, erasers, rulers, and calculators are allowed during the test. No sharing of those items between students is permitted, nor is the use of any cell phone or laptop.

Course-related Materials:

Lecture notes, readings, homework assignments, as well as other relevant information will be posted online for download to help students learn throughout the semester. However, the PowerPoint slides used by the instructor in class will not be made available.

Course Website:

It is the student's responsibility to log into the eLearning course website on a regular basis to keep abreast of the latest developments in the class.

Class Attendance:

Attending class regularly is extremely important and strongly recommended. Whether present or not, each student will be held responsible for any material discussed or announcement made in class. The information will not be repeated by the instructor or the TA during the office hours.

Acceptable Student Behaviors:

Student exhibiting behaviors that interfere with the instructor's ability to conduct the class or other students' opportunity to learn are unacceptable and will not be tolerated. They will be directed to leave the classroom and the instructor may refer them to the Dean of Students Office for consideration of violation of the student code of conduct. Texting or using a cell phone is prohibited during the lecture, so are taking unauthorized pictures and video/audio recording of the lectures without the explicit permission of the instructor.

Extra Credit:

No additional work for extra credit is possible in this class.

Comet Creed

As a Comet, I pledge honesty, integrity, and service in all that I do

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the syllabus: http://go.utdallas.edu/syllabus-policies.

UTD

The descriptions and timelines contained in this syllabus are subject to change at the discretion of the professor.

Appendix 1

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OPRE 6398.001 Prescriptive Analytics
Peer Evaluation Form for Group Homework

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Instructions: The information submitted is final and cannot be changed. So please rate each of your fellow team members with respect to the criteria listed in the table below. Be honest, reasonable, and fair.

Group number: 20

	Amy Becker	Chris Drake	Eileen Flay	Gene Hanks	Yourself
Meeting attendance (15%)	13%	15%	15%	14%	15%
Punctuality of work (15%)	13%	15%	14%	15%	13%
Fair share of work (30%)	28%	30%	26%	27%	29%
Quality of work (40%)	34%	40%	40%	35%	36%
Total (100%)	88%	100%	95%	91%	93%

Name: _____   Signature: _____

Date: _____

Comments: _____

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UTD

Appendix 2

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OPRE 6398.001 Predictive Analytics
Student Background Survey

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Name (please print it clearly in <u>upper case</u>):

(First)   **(Last)**

Current employer (if applicable):

Current position (if applicable):

Work or home phone number (whichever is more convenient):

Principal e-mail address (please print it clearly in <u>upper case</u>):

Undergraduate major(s), university/college, country:

Current major(s) at UTD:

Other graduate study or work experience (major/job title, university/college/company, country) (if any):

Secret code (any combination of up to six letters and/or numbers for posting grades online):