



BUS340, Management Science
Department of International Management and Math, Fall 2018

Instructor Sanja Dudukovic Ph.D. in Statistics
Classes: TUE/FRI 10:00 - 11:15 AM EC-LAC
Professor: Sanja Dudukovic PhD
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Office Hours Tuesday , Friday 11:30-12:30 PM and 4-5 PM ;
Wednesday: by appointment only, Office 4 , LAC
Prerequisites: MAT201, BUS150 or BUS353, Major prerequisites recommended

 **Text:** Anderson, Sweeney: AN Introduction to Management Science, Cengage Ed 14, 2017
 Supplementary readings and working files will be posted on the public drive K/BUS340/Fall2018.

I. Course description: This computer based course is designed to make student a better decision maker in all areas of management: production, marketing, finance, human resource, and inventory and project management. Good decision makers must know how to recognize decision problems, how to represent the essential structure of the decision situation, and how to analyze the problem with the formal mathematical and statically tools based on decision theory. Decision makers need to be able to think effectively about the inputs into a decision analysis, whether to trust the analysis, and how to use the output results to define actions to be performed by their team in today's turbulent and ever-changing business environment. The course will stress formal, quantitative models for resource allocation, while trying to help students to integrate them with descriptive models and improve their native decision making abilities.

II. a. Learning Objectives & Settings: Theoretical quantitative methods are introduced to enable students to make business decisions. Thus students learn : a) Linear programming method as applied to resource allocation in production, investment selection , media selection , transportation , job assignments, make or buy decisions, overtime planning and inventory control ; b) Decision making using Expected Monetary Value -EMV approach , Decision strategy under uncertainty, Business research information evaluation; c) How to make Inventory control decisions; d)How to apply PERT analysis and define project completion time and how to apply leaner programming to crash the project activity time ;d) How to perform simple risk evaluation ; e)How to use Management Scientist software for complex problems with several decision variables and to interpret its output to define managerial actions f) How to perform Risk Analysis with Monte Carlo simulation.

Students learn management science in context as they employ scientific information and methods to investigate and resolve - at least partially - realistic, complex problems in production planning, dynamic revenue planning, financial planning, advertising media selection, make of buy analysis, trans-shipment problems or data envelopment analysis.

When learning occurs around a specific problem, there is an increased likelihood that this learned material will be better retained and more easily applied to similar situations. They gain experience using scientific approaches to work out reasonable solutions to situations that exist in real world. This experience is potentially transferable to the unique problems they will face in their own development projects.

As a byproduct, students will be able to conduct a month long research-development projects to develop a real organizational decision strategy after collecting a real world data from specific companies, explore methods which they had learned in this course, do management science analysis and write a development project: "Management Science in Practice". Ultimately students are asked to make a Power Point presentation and a paper based of their investigation findings. . This build into the course inquiry (involving the student in asking questions and finding answers), the processes of

science, a knowledge of what practitioners do, and the excitement of cutting edge research. Projects are evaluated according the rubric which is given bellow. To enhance understanding of expectations a sample project will be posted on K drive as well.

II. b. Course IT : MS Excel ; Management Scientist ;

- III. Requirements:** On a weekly basis students are asked to submit assignments. Text book assignments are assigned each class but are collected each Friday. Supplementary hands on exercises and the cases are assigned for reading and presentation.
- IV. Assignments :**Weekly aggregate assignments are due each Friday in the class .Checked assignments with a feedback will be given to a student within a week. Late work is not accepted. No penalty by prior arrangement in special circumstances, hospitalization and the like.
- V. Attendance policy:** Regular class attendance is necessary for good performance and is required. In the case of illness official medical excuse should be provided. Non compliance will incur reduction of the final grade by at least 10%. Students who accumulate more than 4 absences regardless the reason are advised to withdraw from the course or they risk receiving an F grade for the course.

IV. Grading policy:	Assignments and discussions	10%
	Quizzes	20%
	Mid-term examination	25%
	Final examination	30%
	Research Projects &Presentation	15%

VI. Academic Dishonesty and Professionalism

Please refer to Franklin’s Statement on Cheating and Plagiarism in the Academic Catalog for the full version (page 217):

https://www.fus.edu/images/pdf/FUS_ACADEMIC_CATALOG_2018_2020_web.pdf To summarize here: you are to do your own work. Behaviors such as copying the work of others, using third-party services, or any other circumvention of doing your own work are dishonest and not acceptable in this class or at this institution.

Students should strive to be “professional” in their conduct in the class, treating fellow students and the professor as they would respect co-workers in a job setting. Students are encouraged to collaborate in advance of completing any assignment, but they should independently conduct any analyses and produce original written reports of any results or answers. i.e., all final written products, unless otherwise noted, should reflect your independent capabilities and your own original work. Students are expected be prepared for each class to arrive promptly for class.

VII. Teaching methods: In addition to teaching-learning methods based on textbooks and cases, within the course new methods are used when appropriate: problem based learning (PBL) and interactive engagement (IE) learning methods. When PBL method is applied, students are given a problem before gaining some knowledge. The problem is posed in such a way that the students discover that they need to gain some new knowledge before they can solve the problem. If IE method is applied, during and after the lecture students do activities in which their lecture-learning is strengthened (by reinforcement) and extended (by application in different contexts). Thus some elements of a student's previous knowledge are becoming stronger and more profound due to its application, while their overall knowledge is becoming broader due to the new ideas-and-computer based skills they are learning from the exploratory extension (where exploration involves extending old knowledge beyond simple application).

Several software products are used: Excel , EXCELL Solver and Management Scientist. The computer based exercises done in the class, will be available after each class on the K /BUS40/Fall 2018 folder.

VII. Active learning & Class assessment: There will be several short tests at the end of the classes. These

tests will not be announced in advance. They serve to assess students learning during the classes and will not be graded.

IX. Students with Disabilities: If you have a physical, psychiatric, or learning disability, and require Accommodations, please let the professor know within the first two weeks of the semester so that your learning needs can be appropriately met. Check the schedule of extended time MT and Final exams with the director of the Writing & Learning Center , Ann Gardner and/or Marta Leto.

X. Class schedule:

- Week1: Introduction & Math review
System of equations - Cramer's rule
Matrix determinants and Cramer's rule with Excel
- Week2: Linear Programming method and algorithm
Optimum solution and slack variables
Operation Management & Production scheduling
Financial planning
(Chapter 2)
- Week3: Linear Programming - Sensitivity analysis
Objective coefficient range
Dual prices and managerial analysis
Right hand side range
Computer output –Management Science interpretation
(Chapter 3)
Quiz 1 review on chapters two and three
- Week4: **Quiz 1 (September 18 or 21)**
Multivariable problems
Applications in Business & Computer applications
(Chapters 3 and 4)
Interpretation of the “Management Scientist” computer output
- Week5: Overtime planning (Chapter 4)
Make or buy decisions (Chapter 4)
Transportation problem (Chapter 6)
- Week6: Integer Programming (Chapter 7)
Financial Planning
Assignment and shipment problem
Research presentations by students on additional applications
From Chapters 4 and 5)
- Week7: MT Review on chapters 2, 3 , 4 , 6 , 7)
Mid-Term Exam (October 12)
- Week 8: Development project description an explanation
Buyes Probability Review
Introduction to decision theory
Descriptive and Normative decision making
Pay off tables –Opportunity Loss Tables
- Week 9: Decision making under uncertainty (Chapter 13)
–EMV, EOL. EVPI
- Week10: Decision tree structures
Decision making with survey information &posterior probability
Posterior probability calculations
EMV with sample information (Chapter 13)
Complex decision trees

Decision tree applications–decision strategy

Quiz 2 (November 20)

Week11: PERT/CPM (Chapter 9)
Crashing project activity time

Week12: Work on project class

Week13: Development Projects, PPT presentations with on line evaluation (November 30)

Final exam review: Chapters 2,3,4 ,7,10,11, 13

Study guide

Sample past exam –in class solution

Final examination –cumulative: date: Friday , December 14, 8:30-10:30 EC-LAC

Chapters 1, 2, 3, 4, 7 ,5, 10,11,13 and notes)

Office hours: TF 11:30 -12:30; TF 16:00-17:00, Wednesday by appointment only, office 4 –LAC

BUS 340: PROJECT

Deadline: November 30

Development Project: The objective of such a project is to investigate, in more depth than in the classes, a specific area, issue, or problem related to Management Science in a real-life organization. You are required to identify an appropriate area, issue, or problem within a manufacturing or service firm of your choice, eventually visit the organization and/or communicate with the appropriate people in the firm, and present your observations and conclusions in the project report. You may, for example, select a production company and study how they manage their resources and how they make their production plan, schedule their project activities, etc. Or, you may select a trading firm and study their inventory management, decision making, etc. The chosen organization may be large or small, manufacturing or service provider, and in the private, public, or not-for-profit sector. If the organization is very large, you should focus on a particular facility and/or on few major product or service lines. Make sure that you do not disclose their information, if considered confidential.

The purpose of these projects is to provide the student with an opportunity to experience problem-solving in operations based on actual situations. The cases are required for you to demonstrate: 1) clear and professional analysis of a business situation 2) Problem formulation and solution and 3) preparation of clear and professional written communication.

Some past projects are given in the following table.

Project title	Company name	Managemnt Science method
Post-Acuisition Integration	PacifiCare Health Systems and UnitedHealthcare	PERT - Project Management
Inventory Control: Sensational Beginnings	Sensational Beginnings	Inventory Control
Elective Surgery Options	The Farah Hospital	Profit Maximization
Transportation & Expert	Lviv Automobile Plant	Minimize cost of goods sold
Portfolio	Government Bonds (yahoo finance)	Financial Planning and bond duration
Transportation Costs	Franklin College	Minimizing cost of transportation while maximizing revenue
Transportation & Inventory: Milton Propane	Milton Propane	Min trans. Cost & inventory
Linear Programming- Meal(pollo) Profit Maximization	Okbar	Profit Maximization
Linear Programming- TV CONDUCTER Profit Maximization	Jungbeker Technology	Profit Maximization
Linear Programming - Profit Max food production	Baobab Initiative	Profit Maximization
Linear programming: Profit Max on kebab	PAN & SALAM RESTAURANT	PROFIT MAXIMISATION
Optimal Decision: Pricing electricity	British Gas	Decision Making

- Once you choose the topic of application and the company ,bring the managerial problem and the data you have found, to me for my approval .(**Deadline :November 20**)
- Set the problem and find the solution ; Come to me to check your results
- Make a Power Point presentation accompanied working files (LPM , Excel) for December 1.

d) Make a Research paper: " **Management Science as applied in** "

Length of the paper , 2500 words minimum excluding tables and graphs.
 Deadline : **December 7.**

Please make a folder which contains : LPM file ,PPT file , EXCEL and Microsoft word file for IBM PC with your final paper. Pdf files are not accepted.

The presentations are to be graded according the following Rubric:

BUS340 -A rating scale Rubric for an Oral Presentation					
The presenters		Strongly Agree	Agree	Disagree	Strongly disagree
Cleary formulated the problem and explained the purpose of the project	15				
Was knowledgeable about the concept and explored it using real world data	20				
Had main points that were appropriate to the central topic	20				
Had collected efficiently data from the company	15				
Acomplished the stated objectives-Cleary stated the conclusion and the findings	15				
Was well organised	10				
Maintained eye contact with the audience and spoke clearly and loudly	5				
		100			

The paper should have the following sections:

Introduction;

The company and business problem description ;

Management Science- Method description ;

Data description and sources ;

Excel data pre- processing ,

Management science output, explanations about what you did and your results ;

A chart of your raw data and all your models;

Findings and recommendation ;

References (books, articles)

After a successful presentation students are expected to download on my USB :

The presentation files as PPT, Word file with a research paper , excel files and LPM files .

One hard copy of the final paper has to be given to me directly in the class or during the office hours.