

Fayetteville State University
The Henry M. Eldridge
Department of Mathematics and Computer Science

Course Syllabus

Spring 2012

I. Location Information

Course Number and Name: Math 372-01 Linear Programming

Semester Hours of Credit: 3

Time Class Meets: 4 – 4:50

Where Class Meets: MWF

Instructor's Name: Mr. P. Gillespie

Office Hours:

Office Location: Lyon Science 228

Phone Number: 672-1522

Final Exam:

II. Course Description:

A study of method and applications of optimizing a linear function subject to linear constraints, the theory of the simplex method and duality; parametric linear programs; sensitivity analysis; modeling and computer implementation.

Prerequisite: Math 251

III. Textbook:

Hamdy A. Taha (1997). Operational Research An Introduction. 8th edition, Prentice Hall, Upper Saddle River, NJ

IV. Objectives:

To provide the necessary background the student with techniques use in Operational Research in the field of Applied Mathematics. After the completion

of this course, they will be able to solve practical optimization problems in business, math, and other areas.

V. Course Competencies Does not apply to this course

VI. Evaluation Criteria/Grading Scale:

The grade scale for determining the grade is given below.

A	92 – 100%	Homework	40%
B	83 – 91%	Mid Term Exam	30%
C	74 – 82%	<u>Final Exam</u>	<u>30%</u>
D	65 – 73%	Total	100%
F	below 64%		

IF A STUDENT MISSES MORE THAN 4 CLASSES, THEIR GRADE WILL BE REDUCE ONE LETTER GRADE!!!!!!!!!!!!

VII. Course Content:

1. Mathematical Background

Matrices, Determinants, Vectors and vector Spaces, Solution Set of Simultaneous Equations.

2. Graphical Solution of Linear Programming Problems

Convex sets, Hyperplane, Extreme-Point Solution, Graphical Solution.

3. Linear programming

Properties of solution to the L-P problem, Development of minimum Feasible Solution, Computational Procedure: SIMPLEX Method.

4. Transportation Problem

General transportation problem, transportation algorithm, and tableau for the Transportation Problem, Finding the Initial basic Feasible Solution: North-West Corner Method, Row-Minimum, Column-Maximum, Matrix Minimum, Vogel's Method

5. Network Flow Problem

Theory of graphs, maximal Flow's in a Network; intuitive approach; Min-cut-Max-Flow Theorem, labeling Technique: Ford-Fulkerson Algorithm.

6. Integer Programming

Introduction, capital Budgeting models, traveling Salesman Problem, Solution of integer Programming Problem, various approaches: Gomory's cutting plane Method, Dakin's branch and bounds algorithm.

7. Scheduling Problem

Introduction, Job-Shop, Scheduling Models, CPM: Critical Path Method, Employee Scheduling.

8. Assignment Problems

Introduction, The Allocation Problem, Oriented Networks, non-oriented Networks, the farmer's problems

9. Dynamic programming

VIII. Course Outline

Lesson Number	Topic of Discussion
1	Introduction to Operation Research
2	Overview of Operation research Ch. 1
3	mathematical background: Matrices, Determinates, Vectors, and Vector Spaces
4	Solution set of simultaneous equations
5	graphical solution of linear programming problems
6	System of linear equations (non-homogeneous) linearly dependent and linear independent vectors
7	slack and surplus variables
8	Properties of solution to the L-P problem
9	development of Minimum Feasible solution Computational Procedure: SIMPLEX Method
10	SIMPLEX METHOD
11	Transportation Problem: North-west Corner, Row-minimum
12	Column- minimum, Matrix Method
13	Mid-term Exam
14	Spring Break
15	Transportation problem
16	Transportation Algorithm
17	Network Flow Problem
18	Hungarian Algorithm
19	Integer Programming

20	Branch and Bound Algorithm
21	Dynamic Programming
22	Markov Chains
23	Final Exam

IX. Course Requirements:

1. The student is expected to pre-study each lesson in advance. The student is expected to complete all assignments and spend adequate time on class work to insure that the course outcomes are met. At least two hours of home study is expected for each class hour. All tests will be announced prior to their administration.
2. It is the responsibility of the student to avail himself/herself at all class meetings, and obtain individual help from the instructor. It is advisable to consult the University Catalogue on the absence from classes.
3. Each student is responsible for maintaining a notebook of problems, selected by instructor. Students are encouraged to include as many additional problems as possible.
4. Students are expected to enter the classroom on time and remain until class ends. Late arrivals and early departures without appropriate excuses will not be tolerated.
5. Each student is encouraged to participate in class discussions for a clearer understanding and meet with the instructor when additional assistance is needed.
6. All class discussions should be done in a soberly, orderly, and respectful manner.
7. **Late homework will not be accepted. No makeup Test**

X. Teaching Strategies:

The teaching strategies used for the majority of the course are lectures and discussion. Student is encouraged to share experiences on the topic discussion. Cooperative and discovery learning is implemented in the class.

XI. References:

1. Linear Programming by G. Hadley, Addison-Wesley
2. Linear Programming , Methods and Applications, by Saul I. Gass, McGraw Hill
3. Introduction to Operation Research Models by Cooper and Bhat, Saunders Co.