IENG 553
Applied Linear Programming

Spring 2019

Instructor:	A. McKendall, Ph.D.	Credit hours: 3
	Associate Professor, IMSE Department	Class: 12 – 12:50 p.m., MWF
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Phone:	304-293-9472	or by appointment

Course Description: This course examines general theories, methods, and applications of linear programming. Topics include simplex method, revised simplex, decomposition, interior point methods, duality, sensitivity analysis, and computer applications.

Prerequisites: IENG 350 (or equivalent).

Textbook: *Linear Programming and Network Flows*, Fourth Edition, by M.S. Bazaraa, J.J. Jarvis, and H.D. Sherali, John Wiley, New Jersey, 2010.

Grading:

2 Midterm Exams	50% (25% each)	
Final Exam	30% (Wed., May 1st, 2-4 p.m.)	
Quizzes/Attendance/Assignments	20%	
	100%	

Grading Assignment:

100% – 90%	A
89% – 80%	B
79% – 70%	C
69% – 60%	D
59% – 0%	F

Homework Assignments/Assignments: Weekly homework assignments will be given to reinforce your understanding of the concepts and tools presented in class as well as to prepare you for quizzes and exams. However, homework assignments will not be collected or graded. Note, assignments may be given periodically throughout the semester which may be collected and graded. You may be required to use **Matlab** or **MPL/CPLEX** to complete homework assignments and assignments.

Quizzes: Quizzes will be given during the first 15-25 minutes of class every second or third Friday, except during exam week. At the end of the semester, the lowest quiz score will be dropped. **Make-up quizzes will not be given**. If you are absent and miss a quiz or arrive late to class, you will receive a score of zero, and this quiz (your lowest quiz score) will be dropped.

Exams: All examinations will be **closed book** and **closed notes**. Also, **calculators will not be permitted** to complete the exams. All work must be shown in order to receive full credit, and instructions should be followed in order to avoid point deductions. There will be **no makeup exams**. However, if you miss one of the first two exams due to serious illness (documented) or serious family emergency (documented), then you will take a **cumulative final exam**. More

specifically, if you miss an exam, you must email me explaining why you will miss (or have missed) the exam within 24 hours before (or after the exam). There is no makeup (cumulative final) exam without a proper and certified excuse. The regular final exam will be a 2-hour exam covering the most recent topics. In contrast, the **cumulative final exam** will be a 3-hour exam covering all topics. If you miss the first two exams, you will receive a zero on one of the exams and will need to take the cumulative final exam to make up for the other one. If you miss only the final exam, you will be required to take the cumulative final exam.

Academic Dishonesty: Acts of academic dishonesty such as cheating or plagiarism on any of the exams, quizzes, or assignments will result in a failing grade (a grade of zero) on that exam, quiz or assignment and will be reported to the student's advisor, department, and college.

Classroom Behavior: Cell phones or other electronic devices must be **turned off and put away** during class. Attend to any personal needs (restroom, phone calls, etc.) prior to class time.

Statement on Attendance: Student **attendance is mandatory**. The basis for an excused absence will follow University and IMSE department policy. If an emergency arises that require an absence from a class, it is **your responsibility to get the notes and all other information that was covered in class from a fellow student**.

Social Justice Statement: West Virginia is committed to social justice. I concur with that commitment and expect to maintain a positive learning environment based upon open communication, mutual respect, and nondiscrimination. Our University does not discriminate on the basis of race, sex, age, disability, veteran status, religion, sexual orientation, color or national origin. Any suggestions as to how to further such a positive and open environment in this class will be appreciated and given serious consideration.

Accommodations: If you are a person with a disability and anticipate needing any type of accommodation in order to participate in this class, please advise me and make appropriate arrangements with Disability Services (293-6700).

Course Topics (may not be taught in this order):
1. Review of Linear Programming (Chapter 1).
2. Algebra and Geometry of the Simplex Method (Chapters 2 and 3).
3. Starting Solution and Convergence (Chapter 4).
4. Revised Simplex Method (Section 5.1).
5. Bounded Variables Simplex Method (Section 5.2).
6. Karush-Kuhn-Tucker Conditions (Section 5.4).
7. Duality Theory (Sections 6.1 – 6.3).
8. Dual Simplex Method (Section 6.4 and 6.6).
9. Sensitivity Analysis (Section 6.7).
10. Cutting Plane Algorithm in Integer Programming (Section 6.7).
11. Decomposition Algorithms (Chapter 7 and Handout).
12. Interior Point Methods (Sections 8.4 – 8.6 and/or Handout).
13. More Linear Programming Applications (Handout).
14. Excel Solver, Matlab, as well as Modeling Language and Solver MPL/CPLEX (Handouts).

Prepared By: A. McKendall, Ph.D.   Date: January 3, 2019