ISE 5643 **Spring 2015**
T. Trafalis

ENGINEERING OPTIMIZATION
(MW 4:30 PM – 5:45 PM)

Reasonable Accommodation Policy

Any student in this course who has a disability that may prevent him/her from fully demonstrating his/her abilities should contact me personally as soon as possible so that we can discuss accommodations necessary to ensure full participation and facilitate your educational opportunities.

General Information

Office:	CEC 116-D	**TA:**	TBA
Phone:	325-0431	**Office:**	TBA
Office Hours:	MW 3:00-4:30	**Office Hours:**	**TBA**
email:	ttrafalis@ou.edu	**email:**	TBA

1. This is a basic course in engineering optimization with emphasis on algorithms and applications. By the end of the course, the students are expected to be able to build optimization models of practical problems and solve them using the tools they learnt in class. Ample opportunity will be given to use available optimization computer codes.

2. Short homework will generally be assigned to illustrate the material in each lecture. Homework is compulsory. Late submissions are unwelcome.

3. There will be two semester exams and a final for this course

4. Course grades will be computed on the following basis:

Exam I	20%	February 25, 2015
Exam II	25%	March 30, 2015
Final Exam	30%	
Homework	25%	

6. Reading assignments represent the topics covered in the class during that lecture week. Students are expected to read them at least once before the next week's lecture.

7. The first 5-10 minutes of every lecture will be devoted to answering questions about the previous lectures. Students are urged to utilize this opportunity.

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TEXTS & REFERENCES

I. TEXTS

Main Text

G.V. Reklaitis, A. Ravindran and K.M. Ragsdell: *Engineering Optimization: Methods and Applications*, Wiley-Interscience.

II. REFERENCES

1. P.E. Gill, W. Murray and M. Wright: Practical Optimization, Academic Press, 1981.
2. R. Fletcher: Practical Methods of Optimization, Second Edition, Wiley, 1987.
3. C.S. Beightler, D.T. Phillips and D.J. Wilde: Foundations of Optimization, Second Edition, Prentice-Hall (1979).
4. L. Cooper and D. Steinburg: Introduction to Methods of Optimization, Saunders Company (1970).
5. D.M. Himmelblau: Applied Nonlinear Programming, McGraw-Hill (1972).
6. G.P. McCormick: Nonlinear Programming, John Wiley, (1983).
7. D.M. Simmons: Nonlinear Programming for Operations Research, Prentice-Hall (1975).
8. D.A. Wismer, and R. Chattergy: Introduction to Nonlinear Optimization, North Holland (1978).

COURSE SCHEDULE

1. Introduction to Optimization (1 week)
   What is an optimization mode, formulation of optimization models in engineering, classification of optimization problems.
2. Single Variable Optimization (3 weeks)
   Optimality criteria, region elimination methods, methods requiring derivatives.
3. Multi Variable Optimization (3 weeks)
   Optimality criteria, direct search methods, gradient based methods.
4. Constrained Optimality Criteria (2 weeks)
   LaGrange multipliers, Kuhn-Tucker conditions.
5. Constrained Direct Search (1 week)
   Direct search methods for constrained optimization problems, random search, complex search.
6. Linearization Methods for Constrained Optimization (1 week)
   Successive LP method, Frank-Wolfe algorithm,
7. Other Optimization Methods (2 weeks)
   Penalty Function Method, Method of Feasible Directions, Convex Simplex Method, Reduced Gradient Method.