NONLINEAR OPTIMAIZATION WITH NONLINEAR INTEGRALS

MATH 8530

Course Description:

The course is focused on using a new mathematical aggregation tool, the nonlinear integral, in nonlinear optimizations and on its applications in information fusion and data mining, where a soft computing technique (genetic algorithms and/or neural networks) is adopted to search numerical optimal solutions approximately. **3 credits**

Prerequisites:

MATH 1960 and MATH 4740. Preferred MATH 4300 and CIST 1400 or equivalent.

Overview of Content and Purpose of the Course:

To provide students with both a theoretical and applied introduction to nonadditive set functions and relevant nonlinear integrals. This course will help students in mathematics, engineering and physics understand and apply certain nonlinear models in data analysis.

Anticipated Audience/Demand:

Graduate students at the Master's or Ph.D. level.

Major Topics:

1) Modeling on Linear and Nonlinear Optimization Problems

2) Information Fusion

3) Nonadditive Set Functions (Importance Measures) and their applications

4) Nonlinear Integrals as a new aggregation tool used in Information Fusion

5) The Inverse Problem of Information Fusion

6) Genetic Algorithm used in Optimizations

7) Pseudo Gradient Search

8) Nonlinear Multiregressions

9) Nonlinear Classification

Methods:

This course will be presented by lecture, student presentation, and class discussion.

<u>Student Role</u>:

Students must attend and participate in class and must complete the course requirements, including student presentations of research papers and projects.

<u>Textbook</u>:

No textbook will be required. Handouts will be provided from the book: Generalized Fuzzy Theory, Zhenyuan Wang and George J. Klir, which is scheduled to be published by Springer in the immediate future.

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