

**Fuzzy Set Theory and Operations Research**  
**MATH 8370**

Page 1 of 3

**1.0 COURSE DESCRIPTION**

- 1.1 Overview of content and purpose of the course:  
The theory and applications of Fuzzy Set is one of the most important and practical models used in modern decision making in almost all areas of management, engineering, etc. The model developments and solution methods can be very subjective and very complicated.
- 1.2 For whom the course is intended:  
The course is intended not only for mathematics students but also for students from any technical area who would like to improve their ability and knowledge in modern decision making.
- 1.3 Prerequisites of the course  
MATH 2030 and MATH 2230
- 1.4 Unusual circumstances of the course  
This course has a very flexible nature which can be applied to many areas of modern applied science.

**2.0 OBJECTIVES**

- 2.1 Students will understand the concepts of FUZZINESS on decision making and problem solving with uncertainty.
- 2.2 Students will have working knowledge on fuzzy technique to solve decision problems. In particular, multiple objective, multiple attribute decision problems.
- 2.3 Students will be able to develop a model for certain type of decision problems with uncertainty and find an acceptable solution.

**3.0 CONTENT AND ORGANIZATION**

- 3.1 Introduction to Fuzzy Sets
  - a. Concepts of Fuzzy Theory
  - b. Real-World Applications
- 3.2 The Basic Fuzzy Set Theory
  - a. Quantification of Ambiguity
  - b. Fuzzy Sets
  - c. Crisp Sets

**Fuzzy Set Theory and Operations Research**  
**MATH 8370**

Page 2 of 3

- d. Fuzzy Operations, Fuzzy Number and Fuzzy Propositions
- 3.3 Fuzzy Regression Models
- 3.4 Fuzzy Decision Making
- 3.5 Fuzzy Quantification Theory
- 3.6 Fuzzy Mathematical Programming: Linear Programming, Multiple Objective Linear Programming and Multi-Level Programming

**4.0 TEACHING METHODOLOGY:**

- 4.1 The lecture method will be used to initiate discussion of the topics.
- 4.2 Students are encouraged to participate in the discussion and/or to ask questions and generally to take as much initiative as possible.

**5.0 EVALUATION-BASIS FOR DETERMINING FINAL GRADE**

- 5.1 In class test will be given at least two times before the final examination and a comprehensive final examination will be given during the final examination week.
- 5.2 Take home assignments will be given during each meeting. The assignments will be collected at the beginning of the next meeting right after the assignment is given. The assignment will be graded.
- 5.3 Term paper and presentation is expected from every student in this class before the end of the semester.
- 5.4 The student's grade will be evaluated based on above 5.1, 5.2, and 5.3. The percentage of each is to be announced on the first day of the class. The following is a typical example for grading.

Test 1 = 1-%                      Test 2 = 10%                      Final Exam = 30%  
Take home assignment = 25%    Project (term paper) = 15%    Presentation = 10%

**5.5 GRADING SCALE**

The grading scale will be given to the students on the first day of class. Plus or minus grades to be used at the discretion of the instructor. Below is a sample

**Fuzzy Set Theory and Operations Research**  
**MATH 8370**

Page 3 of 3

grading scale:

A = 90-100    B = 80-89    C = 70-79    D = 60-69    F = Below 60

**6.0 RESOURCE MATERIAL**

TEXT: An Introduction to Fuzzy Sets: Analysis and Design  
Witold Perycz and Fernando Gomide, Cambridge, MS, MIT Press, 1998.

**6.1 REFERENCES**

1. Fuzzy Multiple Objective Decision Making Methods and Applications, Young-Jou Lai, Ching-Lai Hwang, Springer Verlag, Berlin 1994.
2. Fuzzy Measure Theory, Wang, Z and Klir G., 1995.
3. Fuzzy and Multi-Level Decision Making, S.E. Lee and H.S. Shih
4. Fuzzy Sets and System, (An International Journal).
5. Fuzzy Sets and Their Applications, Vilem Novak, 1989.
6. An Introduction to Fuzzy Logic and Fuzzy Sets, James Buckley, Esfandiar Eslami, 2002.