

Department and Course Number	<b>CEG 419</b>	Course Coordinator	Tom Sudkamp, Kuldip Rattan
Course Title	<b>Introduction to Fuzzy Logic Control</b>	Total Credits	4

BS CE: Elective; BS CS: Elective.

This document was prepared by: Prabhaker Mateti

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### **Catalog Data**

Foundations and philosophy of fuzzy logic control and applications to control theory. Relationship between classical PID control and fuzzy rule-based control. Techniques for rule construction and adaptive fuzzy logic controllers. Case studies of fuzzy logic control applications. **Prerequisites:** EE 413 and EE 414.

### **Text Books and Other Source Materials**

Leonid Reznik, Fuzzy Controllers, Newnes Publishers, 1997, ISBN 0-7506-3492-4.

### **Schedule**

There are two 75 minute lectures and a two hour laboratory scheduled weekly.

### **Topical Prerequisites**

The student should

1. Be able to draw block diagrams.
2. Have a basic understanding of control systems.
3. Have a basic understanding of proportional (P), PD, PI, and PID controllers.
4. Have a basic understanding of MATLAB and SIMULINK.
5. Have a basic understanding of classical set theory.

### **Course Content**

1. Introduction to fuzzy set theory
2. Fuzzy rule bases, inference, modeling
3. Fuzzy proportional controller
4. Fuzzy PI and PD controllers
5. Fuzzy PID controller, parameter adjustment
6. Parameter optimization
7. Learning and adaptation
8. Case studies

## 9. Student presentations

### **Learning Objectives and Desired Outcomes**

The student should

1. Understand the fundamentals of fuzzy set theory.
2. Understand the modules of a fuzzy logic controller (FLC): fuzzification, inference, and defuzzification.
3. Be able to model systems using fuzzy rules.
4. Understand the design of a P, PI, PD, and PID fuzzy controller.
5. Understand algorithms that learn and adapt fuzzy rule bases.

The student should be able to apply these concepts to

1. Design a fuzzy controller to meet predetermined specifications.
2. Compare the abilities of classical and fuzzy controllers.

### **Outcome Measures and Assessment**

Student progress in achieving the desired objectives and outcomes for this course will be monitored and measured through use of entrance and exit surveys, examinations, laboratory assignments, projects, and presentations.

# CEG 419 Introduction to Fuzzy Logic Control

Assessment of Prerequisites

Entrance Survey

Fall 1998, Section 01. Your Name (optional): \_\_\_\_\_

This survey is being conducted during the first week of to help coordinate our curriculum and our courses. Please complete this form and attach a separate sheet containing any comments that you may have.

This course depends on material taught in the prerequisite courses listed. We would like to learn if you have the background that we expect. Please complete the following table.

Table 1: Prerequisites by Courses

Course Number	Taken at	Term/Year	Instructor's Name	Grade
EE 413				
EE 414				

Please assess how well you were prepared by assigning to yourself a letter grade (A, B, C, D, or F) to each of the prerequisite topics listed below.

Table 2: Prerequisites by Topic

Prerequisite Topic	Grade
Ability to draw block diagrams	
Basic understanding of control systems	
Basic understanding of P, PD, PI and PID controllers	
Basic understanding of MATLAB and SIMULINK	
Basic understanding of classical set theory	