**Module Code**: CSU44001  
**Module Name**: Fuzzy Logic and Fuzzy Control Systems  
**ECTS Weighting**: 5 ECTS  
**Semester taught**: Semester 1  
**Module Coordinator**: Khurshid Ahmad

**Module Learning Outcomes**

On successful completion of this module, students will be able to:

- **LO1.** Understanding of uncertainty in data and in modelling
- **LO2.** Knowledge of fuzzy sets and systems
- **LO3.** Skills in building fuzzy knowledge based systems
- **LO4.** Competencies in data analytics
- **LO5.** Application of quasi-intelligent systems to big data analytics

**Module Content**

This course will introduce you to the exciting new field of fuzzy systems and the related topics in machine learning and the so-called deep learning neural nets. Fuzzy systems are in almost daily use: your washing machine has fuzzy controls and many of the refrigerators do too. In both cases, the machines can sense the amount of stuff (clothes or food) and adjust their operations accordingly. Equally, important is the fact that fuzzy control systems are used in managing financial markets, in operating power plants and transportation systems, and as a basis of systems that will deal help process the and almost every aspect that relies on continuous big data related issue. In short there is a fuzzy systems for monitoring and tuning complex systems.

Fuzzy logic has provided a wonderful new basis for how machines can be made to learn much like humans do especially in domains where uncertainty and approximate reasoning are the order of the day. Fuzzy logic is the bridge between the more abstract statistical machine learning and the more complex human knowledge acquisition.

Fuzzy logic has been developed by computer scientists, psychologists, statisticians, and control engineers over the last 30 odd years.

The course will be delivered in five lecture series:

1. **Terminology:** Uncertainty, Approximations and Vagueness (2 Lectures)
2. **Fuzzy Sets and Aggregation Operators** (5 Lectures)
3. **Fuzzy Logic and Fuzzy Systems** (8 Lectures, 3 tutorials)
4. **Fuzzy Control** (8 Lectures, 2 tutorials)
5. **Neuro-fuzzy systems including introduction to neural computing** (4 Lectures)

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1 [TEP Glossary](#)
Lectures, tutorials, online lecture slides,

Lectures are traditionally delivered and copies of the lecture notes covering each of the five key topics are circulated in advance of the lectures. All lectures are available on the TCD Blackboard.

### Assessment Details

<table>
<thead>
<tr>
<th>Assessment Component</th>
<th>Brief Description</th>
<th>Learning Outcomes Addressed</th>
<th>% of total</th>
<th>Week set</th>
<th>Week due</th>
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</thead>
<tbody>
<tr>
<td>Examination</td>
<td>2 hour written examination</td>
<td>LO1, LO2, LO3, LO4, LO5</td>
<td>80%</td>
<td>n/a</td>
<td>n/a</td>
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<tr>
<td>Report</td>
<td>End of term assignment</td>
<td>LO6</td>
<td>20%</td>
<td>6</td>
<td>8</td>
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### Reassessment Details

2 hour written examination (100%)

### Contact Hours and Indicative Student Workload

<table>
<thead>
<tr>
<th>Contact Hours (scheduled hours per student over full module), broken down by:</th>
<th>33 hours</th>
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<tbody>
<tr>
<td>Lectures</td>
<td>28 hours</td>
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<tr>
<td>Software consultation/ Assignment Support</td>
<td>5 hours</td>
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<table>
<thead>
<tr>
<th>Independent study (outside scheduled contact hours), broken down by:</th>
<th>36 hours</th>
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<tbody>
<tr>
<td>preparation for classes and review of material (including preparation for examination, if applicable)</td>
<td>25 hours</td>
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<tr>
<td>completion of assessments (including examination, if applicable)</td>
<td>11 hours</td>
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**Total Hours** 69 hours

### Recommended Reading List


### Module Pre-requisites

**Prerequisite modules:** NONE

### Module Co-requisites

NONE

### Module Website

TCD Blackboard for CS4001 & CS4504

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2 TEP Guidelines on Workload and Assessment