



**ESOGU ELECTRICAL-ELECTRONICS ENGINEERING DEPARTMENT  
COURSE INFORMATION FORM**

| Course Title                        | Course Code |
|-------------------------------------|-------------|
| ENGINEERING DESIGN WITH FUZZY LOGIC | 151228XXX   |

| Semester in Program | Number of Course Hours per Week |          | ECTS Credit |
|---------------------|---------------------------------|----------|-------------|
|                     | Theory                          | Practice |             |
| 8                   | 2                               | 4        | 9           |

| Course ECTS Credit Distribution |                      |        |                   |        |
|---------------------------------|----------------------|--------|-------------------|--------|
| Basic Sciences                  | Engineering Sciences | Design | General Education | Social |
| 0                               | 4                    | 5      | 0                 | 0      |

| Language of Instruction | Course Level  | Course Type |
|-------------------------|---------------|-------------|
| English                 | Undergraduate | Elective    |

|                                 |  |
|---------------------------------|--|
| <b>Prerequisite</b>             | No formal prerequisite; however, prior knowledge of engineering design principles and fuzzy logic is recommended.  |
| <b>Objectives of the Course</b> | This course aims to provide students with hands-on experience in designing an engineering project using fuzzy logic principles. Through teamwork, students will gain practical design experience by applying the knowledge acquired throughout their education. The course also focuses on project management, problem redefinition, and communication skills. |
| <b>Brief Course Content</b>     | Students will form teams to design a complex engineering project. Teams will go through the entire process of engineering design, from understanding the problem to developing and presenting their solutions. Topics include fuzzy logic fundamentals, project management principles, and effective teamwork.   |

| Learning Outcomes of the Course  | Contributed POs | Teaching Methods * | Assessment Methods ** |
|--|-----------------|--------------------|-----------------------|
| 1 Gain hands-on design experience through teamwork.                    | 4               | 12                 | J                     |
| 2 Learn and apply project management techniques.                       | 5               | 14                 | J                     |
| 3 Develop the ability to understand and redefine engineering problems. | 5               | 10                 | J                     |
| 4 Acquire skills to design engineering solutions using fuzzy logic.    | 3               | 14                 | J                     |
| 5 Enhance effective communication skills, both written and verbal.     | 7               | 15                 | E,G                   |
| 6  |                 |                    |                       |
| 7  |                 |                    |                       |
| 8  |                 |                    |                       |

\***Teaching Methods** 1:Lecture, 2:Discussion, 3:Experiment, 4:Simulation, 5:Question-Answer, 6:Tutorial, 7:Observation, 8:Case Study, 9:Technical Visit, 10:Problem Solving, 11:Individual Work, 12:Team/Group Work, 13:Brain Storm, 14:Project Design / Management, 15:Report Preparation and/or Presentation

\*\***Assessment Methods** A:Exam, B:Quiz, C:Oral Exam, D:Homework, E:Report, F:Article Examination, G:Presentation, I:Experimental Skill, J:Project Observation, K:Class Attendance; L:Jury Exam

|                                  |   |
|----------------------------------|---|
| <b>Main Textbook</b>             | Timothy J. Ross, Fuzzy Logic with Engineering Applications, Wiley, 2010.  |
| <b>Supplementary Resources</b>   | John Harris, An Introduction to Fuzzy Logic Applications, Springer, 2021.   |
| <b>Necessary Course Material</b> | Students will require access to MATLAB or other programming tools for fuzzy logic implementations. Additional lab materials for design and testing will be provided during class. |

| Course Weekly Schedule |   |
|------------------------|---|
| 1                      | Introduction to the course and team assignments     |
| 2                      | Fundamentals of fuzzy logic                         |
| 3                      | Fuzzy inference systems                             |
| 4                      | Project planning and management tools               |
| 5                      | Problem definition and analysis                     |
| 6                      | Project design and development                      |
| 7                      | Project design and development                      |
| 8                      | Mid-Term Exams                                      |
| 9                      | Project design and development                      |
| 10                     | Report writing and documentation techniques         |
| 11                     | Prototype testing and debugging                     |
| 12                     | Presentation and communication skills for engineers |
| 13                     | Final project development                           |
| 14                     | Review and feedback                                 |
| 15                     | Final presentations and project report              |
| 16,17                  | Final Exams   |

| Calculation of Course Workload                              |       |                            |                       |
|---|-------|----------------------------|-----------------------|
| Activities  | Count | Time (Hour)                | Total Workload (Hour) |
| Weekly classroom time                                       | 14    | 6                          | 84                    |
| Weekly study time (review, reinforcing, preparation)        | 14    | 8                          | 112                   |
| Homework  |       |                            |                       |
| Taking a quiz   |       |                            |                       |
| Studying for a quiz   |       |                            |                       |
| Oral exam   |       |                            |                       |
| Studying for an oral exam                                   |       |                            |                       |
| Report writing (Preparation and presentation time included) | 1     | 35                         | 35                    |
| Project (Preparation and presentation time included)        | 1     | 39                         | 39                    |
| Presentation (Preparation time included)                    |       |                            |                       |
|   |       |                            |                       |
| Mid-Term Exam   | 1     |                            |                       |
| Studying for Mid-Term Exam                                  | 1     |                            |                       |
| Final Exam  | 1     |                            |                       |
| Studying for Final Exam                                     | 1     |                            |                       |
|   |       | <b>Total workload</b>      | <b>270</b>            |
|   |       | <b>Total workload / 30</b> | <b>9</b>              |
|   |       | <b>Course ECTS Credit</b>  | <b>9</b>              |

| Assessment        |      |
|-------------------|------|
| Activity Type     | %    |
| Presentation      | 30   |
| Jury Exam         | 70   |
| <b>Final Exam</b> | Jury |
| <b>Total</b>      | 100  |

**COURSE CONTRIBUTION TO THE PROGRAM OUTCOMES**

(5: Very high, 4: High, 3: Middle, 2: Low, 1: Very low)

| NO | PROGRAM OUTCOMES   | Contribution |
|----|--|--------------|
| 1  | a. Sufficient knowledge of mathematics   | 1            |
|    | b. Sufficient knowledge of basic sciences  | 1            |
|    | c. Sufficient basic engineering and Electrical-Electronics engineering knowledge   | 1            |
|    | d. Skill of applying all these knowledge and experience to complicated Electrical-Electronics engineering problems   | 3            |
| 2  | Skill of defining, identifying, formulating and solving the complicated problems in Electrical-Electronics engineering and related areas by applying appropriate analysis and modelling methods.   | 4            |
| 3  | Skill of designing a complicated process, system, equipment or product by applying modern design methods under realistic constraints and conditions.   | 4            |
| 4  | To analyze and solve the complicated engineering problems:   | 4            |
|    | a. skill of developing, selecting and applying the required techniques and devices   | 2            |
| 5  | b. skill of using information technologies effectively   | 2            |
|    | To study the complicated on the complicated Electrical-Electronics engineering problems and research subjects:   | 2            |
| 6  | a. skill of experimental design  | 3            |
|    | b. skill of performing the experiments, collecting the data and analyzing and interpreting the results   | 1            |
| 7  | a. Skill of performing individual studies  | 5            |
|    | b. Skill of performing intra and interdisciplinary and multidisciplinary teamwork and studies  | 3            |
| 8  | a. Skill of effective oral and written communication in Turkish and English  | 2            |
|    | b. Skill of improving and using foreign language knowledge   | 4            |
|    | c. Skill of effective reporting, understanding the reports and preparing the design and production reports   | 4            |
|    | d. Skill of effective presentation and giving and getting clear and understandable instructions.   | 2            |
| 9  | Awareness of the necessity of life-long learning and skill of accessing to information and following the improvements in contemporary science and technology   | 1            |
| 10 | a. Awareness of necessity of behaving in accordance with the ethical principles and awareness of the importance of having professional ethical responsibilities  | 2            |
|    | b. Knowledge about legal regulations and standards of engineering  | 4            |
| 11 | a. Knowledge about project management, risk management and change management   | 1            |
|    | b. Awareness of the significance of entrepreneurship and innovation  | 1            |
|    | c. Knowledge about sustainable development   | 1            |
| 12 | Knowledge about the effects of engineering applications and practices on the global and social health, ecology and safety, knowledge about the current problems in relation to the working areas of Electrical-Electronics engineering; and awareness of the legal issues resulting from engineering solutions | 1            |
| 12 | Knowledge about modern problems in local and universal scale   | 1            |

**INSTRUCTORS**

|                    |                    |  |  |  |
|--------------------|--------------------|--|--|--|
| <b>Prepared by</b> | Hasan Serhan Yavuz |  |  |  |
|--------------------|--------------------|--|--|--|

Date:25.10.2024