

| MM 527 Combustion and Combustion Technology |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |        |      | MECHANICAL ENGINEERING DEPARTMENT |                     |       |                |         |                |
|---------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|------|-----------------------------------|---------------------|-------|----------------|---------|----------------|
| Semester                                    | Methods of Education                                                                                                                                                                                                                                                                                                                                                                                                                                              |        |      |                                   |                     |       |                | Credits |                |
|                                             | Lecture                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Recit. | Lab. | Project/Fiel<br>d Study           | Homework            | Other | Total          | Credit  | ECTS<br>credit |
| 1,2                                         | 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 30     |      |                                   |                     | 146   | 188            | 3       | 7.5            |
| Language                                    | Turkish                                                                                                                                                                                                                                                                                                                                                                                                                                                           |        |      |                                   |                     |       |                |         |                |
| Compulsory /<br>Elective                    | Optional                                                                                                                                                                                                                                                                                                                                                                                                                                                          |        |      |                                   |                     |       |                |         |                |
| Prerequisites                               | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |      |                                   |                     |       |                |         |                |
| Course<br>Contents                          | Fundamentals of combustion and combustion systems. Fuels and fundamental phases of combustion process. Combustion calculations. Homegenous mixing and combustion of gaseous fuels. Turbulence in tube flow and in free volume. Free jets and jets with rotation. Burner and burner design ignition and combustion processes.Combustion chamber design. Heterogenous combustion of pulverized coal. Pulverisation and combustion systems. Combustion of lump coal. |        |      |                                   |                     |       |                |         |                |
| Course<br>Objectives                        | To give necessary know ledge to the students on combustion and combustion technology and its applications. To introduce basic properties and importance of combustion systems applications. The aim of the course is to help the development of the national industry. To help the development of the combustion engineering skills of the students.                                                                                                              |        |      |                                   |                     |       |                |         |                |
| Learning<br>Outcomes and<br>Competences     | To give the related theory and practice the students. Understanding of basic properties of combustion and combustion. Learning the usage of the methods for research, design and development in the analysis of the energy transformation at applications of combustion and combustion technology..                                                                                                                                                               |        |      |                                   |                     |       |                |         |                |
| Textbook<br>and /or<br>Reference            | 1. Combustion Engineering, Borman , G.L., McGraw-Hill<br>2. Kömür Özellikleri Teknolojisi ve Çevre İlişkileri, Kural, O., İTÜ, Maden Mühendisliği Böl., İstanbul.<br>3. Yanma ve Yakma Sistemleri ve Hava Kirliliği, Durmaz, A., G.Ü. Makine Müh.Böl., Ankara                                                                                                                                                                                                     |        |      |                                   |                     |       |                |         |                |
| Assessment<br>Criteria                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |        |      |                                   | If any, mark as (X) |       | Percentage (%) |         |                |
|                                             | Midterm Exams                                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |                                   | X                   |       | 40             |         |                |
|                                             | Quizzes                                                                                                                                                                                                                                                                                                                                                                                                                                                           |        |      |                                   |                     |       |                |         |                |
|                                             | Homeworks                                                                                                                                                                                                                                                                                                                                                                                                                                                         |        |      |                                   |                     |       |                |         |                |
|                                             | Projects                                                                                                                                                                                                                                                                                                                                                                                                                                                          |        |      |                                   |                     |       |                |         |                |
|                                             | Term Paper                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |      |                                   |                     |       |                |         |                |
|                                             | Laboratory Work                                                                                                                                                                                                                                                                                                                                                                                                                                                   |        |      |                                   |                     |       |                |         |                |
|                                             | Other                                                                                                                                                                                                                                                                                                                                                                                                                                                             |        |      |                                   |                     |       |                |         |                |
|                                             | Final Exam                                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |      |                                   | X                   |       | 60             |         |                |
| Instructors                                 | Assist.Prof. Ibrahim ATILGAN                                                                                                                                                                                                                                                                                                                                                                                                                                      |        |      |                                   |                     |       |                |         |                |
| Week                                        | Subject                                                                                                                                                                                                                                                                                                                                                                                                                                                           |        |      |                                   |                     |       |                |         |                |
| 1                                           | Introduction and Fundamental Concepts.                                                                                                                                                                                                                                                                                                                                                                                                                            |        |      |                                   |                     |       |                |         |                |
| 2                                           | Fundamentals of Combustion and Combustion Systems.                                                                                                                                                                                                                                                                                                                                                                                                                |        |      |                                   |                     |       |                |         |                |
| 3                                           | Fuels and Fundamental Phases of Combustion Process                                                                                                                                                                                                                                                                                                                                                                                                                |        |      |                                   |                     |       |                |         |                |
| 4                                           | Combustion Calculations.                                                                                                                                                                                                                                                                                                                                                                                                                                          |        |      |                                   |                     |       |                |         |                |
| 5                                           | Homegenous Mixing and Combustion of Gaseous Fuels.                                                                                                                                                                                                                                                                                                                                                                                                                |        |      |                                   |                     |       |                |         |                |
| 6                                           | Turbulance in Tube Flow and in Free Volume.                                                                                                                                                                                                                                                                                                                                                                                                                       |        |      |                                   |                     |       |                |         |                |
| 7                                           | Applications, Midterm Exam I.                                                                                                                                                                                                                                                                                                                                                                                                                                     |        |      |                                   |                     |       |                |         |                |
| 8                                           | Free Jets and Jets With Rotation.                                                                                                                                                                                                                                                                                                                                                                                                                                 |        |      |                                   |                     |       |                |         |                |
| 9                                           | Burner and Burner Design Ignition and Combustion Processes.                                                                                                                                                                                                                                                                                                                                                                                                       |        |      |                                   |                     |       |                |         |                |
| 10                                          | Combustion Chamber Design.                                                                                                                                                                                                                                                                                                                                                                                                                                        |        |      |                                   |                     |       |                |         |                |
| 11                                          | Combustion of Pulverized Coal.                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |      |                                   |                     |       |                |         |                |
| 12                                          | Pulverisation and Combustion Systems.                                                                                                                                                                                                                                                                                                                                                                                                                             |        |      |                                   |                     |       |                |         |                |
| 13                                          | Applications, Midterm Exam II.                                                                                                                                                                                                                                                                                                                                                                                                                                    |        |      |                                   |                     |       |                |         |                |
| 14                                          | Heterogenous Combustion of Lump Coal.                                                                                                                                                                                                                                                                                                                                                                                                                             |        |      |                                   |                     |       |                |         |                |