

# THERMODYNAMICS

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| 1    | Course Title:   | THERMODYNAMICS   |
| 2    | Course Code:  | MKNS215  |
| 3    | Type of Course:   | Optional   |
| 4    | Level of Course:  | Short Cycle  |
| 5    | Year of Study:  | 2  |
| 6    | Semester:   | 3  |
| 7    | ECTS Credits Allocated:   | 3.00   |
| 8    | Theoretical (hour/week):  | 2.00   |
| 9    | Practice (hour/week):   | 0.00   |
| 10   | Laboratory (hour/week):   | 0  |
| 11   | Prerequisites:  | None   |
| 12   | Language:   | Turkish  |
| 13   | Mode of Delivery:   | Face to face   |
| 14   | Course Coordinator:   | Öğr.Gör. Oğuzhan Çankaya   |
| 15   | Course Lecturers:   |  |
| 16   | Contact information of the Course Coordinator:                        | e-posta: oguzhanc@uludag.edu.tr<br>oda tel: 0 224 294 23 38  |
| 17   | Website:  |  |
| 18   | Objective of the Course:  | The aim of this course is to gain students competencies applying thermodynamics laws to open and closed systems.               |
| 19   | Contribution of the Course to Professional Development:               |  |
| 20   | Learning Outcomes:  |  |
|      | 1   | Applies the basic equation, units and calculation methods used in the analysis of thermodynamics.                              |
|      | 2   | Explains the location and the basic concepts of thermodynamics as a science, described the systems and their basic properties. |
|      | 3   | Uses the reference tables in thermodynamic applications.   |
|      | 4   | Solves the problem related to work and heat.   |
|      | 5   | Analyses the laws of thermodynamics.   |
|      | 6   | Explains changes in states and the principles of overall conversion  |
|      | 7   | Analyses the ideal weather cycles (otto, diesel, hybrid loop).   |
|      | 8   | Calculates efficiency, power and work in internal combustion engines.  |
|      | 9   | Explains the classification and the physical and chemical properties of fuels.   |
|      | 10  | Explains combustion engines and engine knocking.   |
| 21   | Course Content:   |  |
|      | <b>Course Content:</b>  |  |
| Week | Theoretical   | Practice   |
| 1    | Thermodynamic concepts and definitions, Zeroth law of thermodynamics. |  |
| 2    | Heat and work concepts and applications.                              |  |

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| 3  | Thermodynamic properties of pure substances, P-v-T surfaces.   |  |
| 4  | The ideal gas equations and change of state.   |  |
| 5  | First law of thermodynamics.   |  |
| 6  | First law of thermodynamics.   |  |
| 7  | Engine cycles and make comparison.   |  |
| 8  | In internal combustion engines work, power and efficiency.   |  |
| 9  | Repeating courses and midterm exam   |  |
| 10 | In internal combustion engines work, power and efficiency.   |  |
| 11 | Fuels, physical and chemical characteristics of fuels, Analysis of the physical and chemical properties of the combustion, combustion of the spark ignition engines    |  |
| 12 | Combustion of compression ignition engines, classification of fuels, hydrocarbons, alcohols and their derivatives, classification of combustion, combustion equations. |  |
| 13 | End of the combustion products, tables related to fuels and combustion, alternative fuels and combustion   |  |
| 14 | Engine knocking, evaporation of fuels, knock resistance.   |  |

| Activites                        |                            |  | Number | Duration (hour) | Total Work Load (hour) |
|----------------------------------|----------------------------|--|--------|-----------------|------------------------|
| Theoretical                      |                            |  | 34     | 2.00            | 28.00                  |
| Practicals/Labs                  |                            |  | 0      | 0.00            | 0.00                   |
| 23                               | Self study and preparation |  | 13     | 1.00            | 13.00                  |
| Homeworks                        |                            |  | 1      | 15.00           | 15.00                  |
| Projects                         |                            |  | 1      | 10.00           | 10.00                  |
| Midterm Exam                     |                            |  | 1      | 10.00           | 10.00                  |
| Field Studies                    |                            |  | 0      | 0.00            | 0.00                   |
| Midterm exams, Home work-project |                            |  | 1      | 10.00           | 10.00                  |
| Others                           |                            |  | 0      | 0.00            | 0.00                   |
| Final Exams                      |                            |  | 1      | 15.00           | 15.00                  |
| Total                            |                            |  | 3      | 100.00          |                        |
| Total Work Load                  |                            |  |        |                 | 91.00                  |
| Total work load/ 30 hr           |                            |  |        |                 | 3.03                   |
| ECTS Credit of the Course        |                            |  |        |                 | 3.00                   |

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| Measurement and Evaluation Techniques Used in the Course |  |
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[illegible]

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|---|------------|---|---|-------|---|---|----------|---|---|--------|---|---|-------------|---|---|---|
| ÖK3   | 0          | 0 | 0 | 0     | 0 | 0 | 0        | 0 | 0 | 0      | 0 | 0 | 0           | 0 | 0 | 0 |
| ÖK4   | 0          | 0 | 0 | 0     | 0 | 0 | 0        | 0 | 0 | 0      | 0 | 0 | 0           | 0 | 0 | 0 |
| ÖK5   | 0          | 0 | 0 | 0     | 0 | 0 | 0        | 0 | 0 | 0      | 0 | 0 | 0           | 0 | 0 | 0 |
| ÖK6   | 0          | 0 | 0 | 0     | 0 | 0 | 0        | 0 | 0 | 0      | 0 | 0 | 0           | 0 | 0 | 0 |
| ÖK7   | 0          | 0 | 0 | 0     | 0 | 0 | 0        | 0 | 0 | 0      | 0 | 0 | 0           | 0 | 0 | 0 |
| ÖK8   | 0          | 0 | 0 | 0     | 0 | 0 | 0        | 0 | 0 | 0      | 0 | 0 | 0           | 0 | 0 | 0 |
| ÖK9   | 0          | 0 | 0 | 0     | 0 | 0 | 0        | 0 | 0 | 0      | 0 | 0 | 0           | 0 | 0 | 0 |
| ÖK10  | 0          | 0 | 0 | 0     | 0 | 0 | 0        | 0 | 0 | 0      | 0 | 0 | 0           | 0 | 0 | 0 |
| LO: Learning Objectives    PQ: Program Qualifications |            |   |   |       |   |   |          |   |   |        |   |   |             |   |   |   |
| Contribution Level:                                   | 1 very low |   |   | 2 low |   |   | 3 Medium |   |   | 4 High |   |   | 5 Very High |   |   |   |