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| **logo University of Management & Technology**  School of Science & Technology  Department of Electrical Engineering | | | |
| ME 322 Applied Thermodynamics | | | |
| **Lecture Schedule** | Tues,Thurs 16:00 – 17:20 (Sec A)  Mon,Wed 16:00 – 17:20 (Sec B)  Tues,Thurs 14:40-16:00 (Sec C)  Mon,Wed 14:40-16:00 (Sec D)  Tues,Thurs 16:00 – 17:20 (Sec E) | **Semester** | Fall 2012 |
| **Pre-requisite** | None | **Credit Hours** | 3 |
| **Instructor(s)** | Mehwish Mujahid1 (Sec A&C)  Muhammad Shoaib2 (Sec B,D&E) | **Contact** | [Mehwish.mujahid@umt.edu.pk](mailto:Mehwish.mujahid@umt.edu.pk)1  [Muhammad.shoaib@umt.edu.pk2](mailto:Muhammad.shoaib@umt.edu.pk2Basit.Shahab@umt.edu.pk3) |
| **Office** | 3S-33,Room 21  2nd Floor, SST Offices South Block2 | **Office Hours** | See office window |
| **TA** | None | **Contact** | N/A |
| **Course Description** | This course introduces students to the basic concepts of thermodynamics, properties of pure substances, energy transfer and general energy analysis, energy analysis of closed systems, zeroth first, second and third law of thermodynamics, entropy, heat engine, heat pump and refrigerator, gas power cycles (Otto, Diesel, Stirling, Ericsson, and Brayton engines),vapor and combined power cycles (Rankine engines). The course directly contributes to **objectives** a, d, e and f of the HEC Electrical Engineering Curriculum. | | |
| **Expected Outcomes** | In accordance with HEC curriculum **outcomes** a, b, d, e, g, h & i, students at the end of the course should be able to   * Understand the principles of thermodynamics. * Applications of heat engines and refrigeration. * Understand the operation of present day heat engines * Develop the concept of Refrigeration and any future development in the field. | | |
| **Textbook(s)** | **Recommended Text Book:**  “Thermodynamics - An Engineering Approach”, by Yunus A. Cengel and Michael A. Boles, 6th Edition, Tata McGraw Hill, 2006.  **Reference Books:**   * Applied thermodynamics for engineers and Technologists, T. D. Eastop and Mckonkey, Longman, 5th Edition. * Applied thermodynamics, by Onkar Singh, 3rd Edition, New Age International Publishers. * Fundamentals of Engineering Thermodynamics, by Moran & Shapiro, 6th edition. | | |
| **Grading Policy** | Final Term: 50% Mid Term: 25%  Quizzes & Assignments: 25% | | |

**Course Schedule**

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| **Lecture** | **Topics** | **Textbook (TB) /**  **Reference (Ref) Readings** |
| 1 - 2 | Thermodynamics and energy, Temperature and the zeroth law of thermodynamics | TB 1.1 – 1.11 |
| 3 - 4 | Forms of energy and energy transfer, Forms of work and first law of thermodynamics | TB 2.1 – 2.7 |
| 5 - 7 | Phases of a pure substance, Property diagrams for phase-change processes, The ideal gas equation of state | TB 3.1 – 3.6 |
| 8 - 10 | Energy analysis of closed systems, Specific heats, Internal energy and enthalpy | TB 4.1 – 4.5 |
| 11 - 12 | Mass and energy analysis of control volumes, Nozzles and diffusers, Turbines, compressors, and throttling valves, | TB 5.1 – 5.4 |
| 13 - 14 | Introduction to second law of thermodynamics, Heat engines, refrigerators, and heat pumps | TB 6.1 – 6.4 |
| 15 | Reversible and irreversible processes | TB 6.6 – 6.8 |
| **Mid Term Exam (8th Week)** | | |
| 17 | The thermodynamic temperature scale | TB 6.9 – 6.11 |
| 18 | Third Law of thermodynamics and its numerical problems. | Notes |
| 19 -21 | Entropy and the increase of entropy principle, Isentropic processes and property diagrams, The entropy change of ideal gases. | TB 7.1 – 7.10 |
| 22 – 24 | Isentropic efficiencies of steady-flow | TB 7.12 – 7.13 |
| 25 – 29 | Basic consideration in the analysis of power cycle, Otto Cycle: For spark-ignition engines, Diesel, Stirling and Ericsson Cycles for engines, Brayton Cycle: For gas-turbine engines | TB 9.1 – 9.8 |
| 30 – 31 | The Carnot vapor cycle, Rankine Cycle: For vapor power cycle | TB 10.1 – 10.4 |
| **Final Term Exam (Comprehensive)** | | |