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**Department of General Science**

**College of Basic Education**

**University of Salahaddin**

**Subject: Thermodynamics**

**Course Book : (3rd Year)**

**Lecturer's name : Assist. Prof. Dr. Tarik Siddik RESHKINI**

**Academic Year: 2022 - 2023**

**Course Book**

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| **1. Course name** | **Thermodynamics** |
| **2. Lecturer in charge** | **Tarik Siddik** |
| **3. Department/ College** | **General Science** |
| **4. Contact** | **e-mail: ( tarik.reshidsu.edu.krd)** |
| **5. Time (in hours) per week** | **Theory: 2 +3 Practical** |
| **6. Office hours** | **Availability of the lecturer to the student during the week** |
| **7. Teacher's academic**  **profile** | [**https://sites.google.com/a/su.edu.krd/tarik-siddik/**](https://sites.google.com/a/su.edu.krd/tarik-siddik/) |
| **8. Course objective:**  This course deals with the fundamentals of Thermodynamics including thermodynamic systems  and properties, relationships among the thermos-physical properties, the laws of thermodynamics  and applications of these basic laws in thermodynamic systems. | |
| **9. Assessment scheme**  There will be one mid-term exam and a final cumulative exam | |
| **10. Student learning outcome:**  Students will be able to research, compile and present an assigned topic in the field of Thermodynamics . | |
| **11. Course Reading List and References‌:**  1- Thermodynamics, Kinetic Theory, and Statistical Thermodynamics : Francis W. Sears  2- "Fundamentals of Thermodynamics" by Borgnakke and Sonntag  3-University physics : young& Freedman .  3- Physics: Resnick, Halliday and Krane . | |

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| **12. The Topics:** |  |
| Week 1+2+3 : Fundamental concept in Thermodynamic: What is Thermodynamics? Heat,  Temperature, System & Surroundings , Type of Thermodynamic Well , Types of  Thermodynamic Systems , Properties of a System , State, Equilibrium and Process ,  Thermodynamic process, Pressure, Temperature and its measurement , Temperature scales ,  What is Thermometer?, Thermometric substance , Calibrate a thermometer on the  centigrade scale, Types of Thermometers,  Week:4 5+6+7: Thermal expansion, Types of Thermal Expansion, Linear Expansion , Area  Expansion, Volume Expansion, Thermal Stress, Thermal expansion of solids and liquids,  Atomic bonding in solids,Heat transfer: Thermal conduction, Some Cases in Heat Flow , Heat flow though a bar, Radial heat flow, Heat flow through the walls of a cylindrical tube,  Heat flow through composite walls.  Week 8+9+10+11: Convection, Radiation, Black body, Laws of black body radiation,  Newton law of cooling, Wine's law, Kinetic Theory of Gas: Kinetic Theory of matter  Ideal Gas law, Equation of state, Boyle’s Law.  Charles’s Law.  Dalton’s Law.  Avogadro's Law.  Joule’s Law.  Gay-Lussac’s Law. |  |

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| **13. Examinations:**  ***1. Compositional:*** In this type of exam the questions usually starts with Explain how,  What are the reasons for…?, Why…?, How….?  ***2. True or false type of exams:***  In this type of exam a short sentence about a specific subject will be provided, and then  students will comment on the trueness or falseness of this particular sentence.  ***3. Multiple choices:***  In this type of exam there will be a number of phrases next or below a statement, students  will match the correct phrase.  Q/. (20) Diatomic nitrogen, N2, exists at T = 65.9 K, v = 0.4 m3/kg. Find the  pressure.  Q/. (40) A mass, 10 kg, of H2O initially at T1 = 30 ◦C, v1 = 0.001080 m3/kg is  heated isochorically to state 2 where T2 = 140 ◦C. It then undergoes an isobaric  process to state 3 where T3 = 250 ◦C.  (a) Find the final specific volume.  (b) Accurately sketch the total process in the P −v, T −v, and P −T planes.  Label each state in your sketch giving numerical values for P, T, v. Include  the vapor dome in its correct position.  (c) Find the work done in the total process.  Q/  (a) What is the atmosphere pressure?  (b) What is the initial phase and temperature of the water? If it is a two-phase mixture,  what is the quality x1?  (c) What is the final pressure and temperature of the water?  (d) How much work is done on the piston by the water during this expansion process?  (e) Accurately sketch the process in the P − v plane with respect to saturation curve. |