

第一週	<b>Ch.1 Introduction and Definitions of Terms (I):</b> 1. What do we learn from “Materials Thermodynamics”? 2. Classical versus Statistical Thermodynamics, 3. Thermodynamics versus Kinetics. 4. Thermodynamic systems of materials, 5. Thermodynamic variables, 6. Concept of state, 7. How to distinguish a state function.
第二週	<b>Ch.1 Introduction and Definitions of Terms (II):</b> 8. Equation of state of an ideal gas. <b>Ch.2 First Law of Thermodynamics:</b> 1. Energy conversion, 2. Relation between heat and work, 3. First law of thermodynamics, 4. Internal energy (U) and Enthalpy (H), 5. Heat capacity. 6. Reversible Adiabatic Process, 7. Reversible Isothermal Process, 8. Calculation examples for monatomic ideal gas.
第三週	<b>Ch.3 Second Law of Thermodynamics (I):</b> 1. Spontaneous Process and Reversible Process, 2. Entropy and Degree of Irreversibility, 3. Entropy and Reversible Heat, 4. Reversible Isothermal Compression of Ideal Gas, 5. Reversible Adiabatic Expansion of Ideal Gas. 6. Properties of Heat Engine, 7. Thermodynamic Temperature Scale,
第四週	<b>Ch.3 Second Law of Thermodynamics (II):</b> 8. Second Law of Thermodynamics. 9. Maximum Work for Reversible Process, 10. Criterion for Equilibrium, 11. Combined Statement of 1 <sup>st</sup> and 2 <sup>nd</sup> Laws.
第五週	<b>Ch.3 Second Law of Thermodynamics (III):</b> 12. Calculation Examples. <b>Ch. 4 Auxiliary Functions (I):</b> 1. Defined Functions of H, A, G and their differential equation. 2. Enthalpy and constant pressure heat, 3. Helmholtz Free Energy.
第六週	<b>Ch. 4 Auxiliary Functions (II):</b> 4. Gibbs Free Energy, 5. Summary of Criteria for Equilibrium, 6. Coefficient Relations, 7. Maxwell Relations, 8. Reciprocal and Ratio Relation,
第七週	<b>Ch. 4 Auxiliary Functions (III):</b> 9. Derived equations: 1 <sup>st</sup> , 2 <sup>nd</sup> , 3 <sup>rd</sup> TdS equations; Gibbs-Helmholtz Equation; $c_p - c_v$ ; and other important equations for ideal gas. 10. General Strategy for Deriving Thermodynamic Relations,
第八週	<b>Ch. 4 Auxiliary Functions (IV):</b> 11. Application to an Ideal Gas, 12. Application to Solids and Liquids, 13. Calculation Examples.
第九週	<b>Mid-term exam;</b> <b>Ch.5 Statistical Thermodynamics (I):</b>

	1. Physical Significance of U and S, 2. Entropy and Disorder on an Atomic Scale, 3. Macrostate and Microstate
第十週	<b>Ch.5 Statistical Thermodynamics (II):</b> 4. Determination of the Most Probable Microstate, 5. Partition Function and Boltzmann Equation for Entropy, 6. Heat Flow and Entropy Production, 7. Configurational Entropy and Thermal Entropy, 8. Calculation Examples, 9. Calculation of S, A, U, $C_v$ from Partition Function.
第十一週	<b>Ch.5 Statistical Thermodynamics (III):</b> 10. A model with Two Energy Levels, 11. Internal Energy and Heat Capacity of a Crystal, 12. Internal Energy and Heat Capacity of Monatomic and Polyatomic Ideal Gases.
第十二週	<b>Ch.6 Heat Capacity, Enthalpy, Entropy as a function of T (I):</b> 1. Heat Capacity, 2. $H_p(T)$ , $\Delta H_p(T)$ and $\Delta Q$ (Heat of Reaction), 3. $S(T)$ and the 3 <sup>rd</sup> Law of Thermodynamics, 4. Experimental Verification of 3 <sup>rd</sup> Law.
第十三週	<b>Ch.6 Heat Capacity, Enthalpy, Entropy as a function of T (II):</b> 5. Influence of P on $\Delta H$ and $\Delta S$ , 6. Calculation Examples.
第十四週	<b>Ch.7 Phase Equilibrium in One Component System (I):</b> 1. Thermodynamic Equilibrium, 2. $G(T)$ , $\Delta G(T)$ at constant $P=1$ atm, 3. $G(P)$ , $\Delta G(P)$ at constant T, 4. Phase Equilibrium Between Solid and Liquid, 5. Phase Equilibrium Between Condensed phases and Vapor.
第十五週	<b>Ch.7 Phase Equilibrium in One Component System (II):</b> 6. Phase Diagram in One Component System, 7. Solid-Solid Equilibrium (Allotropy), 8. Calculation Examples.
第十六週	<b>Ch.8 Behavior of Real Gases (I)</b> 1. Ideal Gas versus Real Gas, 2. P-V-T Relationships of Gases, 3. Deviation from Ideality and Equations of State for Real Gases, 4. Van der Waals Gas, 5. Other Equations of State for Nonideal Gases.
第十七週	<b>Ch.8 Behavior of Real Gases (II)</b> 6. Thermodynamic Treatment of Nonideal Gases, 7. Calculation Examples.
第十八週	<b>Final Exam.</b>