Programme	Bachelor of Science in Solid State Physics (BS SS Physics)	**Course Code**	**SSP-203**	**Credit Hours**	3 (2-1)
Course Title	**Heat and Thermodynamics**				

Course Introduction

This course will give the concept of:

1. Heat and temperature
2. To give the concept of classical distribution function
3. To understand the laws of thermodynamics and their application

Learning Outcomes

By the end of this course, students will be able to:

1. To relate heat transfer to temperature change.
2. Memorize temperature equations for Celsius, Fahrenheit and Kelvin conversions.
3. Understand how body temperature can vary.

	Course Content	**Assignments/Readings**
Week 1	**Unit-I** 1.1 Statistical Mechanics 1.1.1 Statistical distribution and mean values, Mean free path and microscopic calculations of mean free path	What is mechanics
Week 2	**Unit-II** 2.1 Distribution of molecular speeds, Distribution of energies, Maxwell distribution, Maxwell-Boltzmann energy distribution	Distribution functions
Week 3	**Unit-III** 3.1 Internal energy of an ideal gas. Brownian motion, Qualitative description. Diffusion, Conduction and viscosity	What is ideal gas
Week 4	**Unit-IV** 1.1 Heat and Temperature 4.1.1 Temperature, Kinetic theory of the ideal gas, Work done on an ideal gas	Define work done

Week 5	**Unit-V** 1.1 Review of previous concepts	Practice
Week 6	**Unit-VI** 1.1 Internal energy of an ideal gas 6.1.1 Equipartition of energy. Intermolecular forces. Qualitative discussion. Van der Waals equation of state	Discussion
Week 7	**Unit-VII** 1.1 Thermodynamics 7.1.1 Review of previous concepts	
Week 8	Mid Term Exams	
Week 9	**Unit-VIII** 8.1 First law of thermodynamics and its applications to adiabatic, isothermal, cyclic and free expansion	Apply First law of thermodynamics
Week 10	**Unit-IX** 9.1 Reversible and irreversible processes, Second Law of thermodynamics, Carnot theorem, Carnot engines. Heat engine	What is ideal heat engine
Week 11	**Unit-X** 10.1 Refrigerators. Calculation of efficiency of heat engines. Thermodynamic temperature scale: Absolute zero:	What is absolute zero
Week 12	**Unit-XI** 11.1 Entropy, Entropy in reversible process, Entropy in irreversible process. Entropy & second law. Entropy & probability	
Week 13	**Unit-XII** 12.1 Thermodynamic functions: Thermodynamic functions (Internal energy, Enthalpy)	Define enthalpy
Week 14	**Unit-XIII** 13.1 Gibb's functions, Entropy, Helmholtz functions, Maxwell's relations, TdS equations, Energy equations and their applications	What is Gibb's free energy
Week 15	**Unit-XIV** 14.1 Low Temperature Physics, Liquification of gases, Joule Thomson effect and its equations.	Presentations

	Thermoelectricity, Thermocouple, Seebeck's effect, Peltier's effect, Thomson effect	
Week 16	Final Term Exams	

Textbooks and Reading Material

1. J. F. Lee and F. W. Sears, Thermodynamics, Addison-Wesley 1954.
2. A. J. Pointon, Introduction to Statistical Physics, Longman 1967.
3. M. W. Zemansky, Heat and Thermodynamics, 3rd Edition, McGraw Hill, 1951.
4. Reif, Statistical Physics, Berkley Physics series, McGraw

Teaching Learning Strategies

1. Course Teaching
2. Presentations
3. Quiz

Assignments: Types and Number with Calendar

1.
2.
3.
4.

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.