AMITY UNIVERSITY
UTTAR PRADESH

Course Title: **Basic Thermal Engineering & Statistical Methods**

Credit Units: 3

Course Level: UG

Course Code: SAE201

L	T	P/ S	SW/F W	TOTAL CREDIT UNITS
3	0	0	0	3

Course Objectives: To enable students to understand the various concepts and phenomena of thermal engineering as applied to Alternate and Renewable Energy Sources

Prerequisites: NIL

Course Contents/ Syllabus:

	Modules	Weightage
1	**Module I Introduction to Thermal Engineering**	
	• Thermal energy science • Basic principles of thermodynamics and fluid dynamics, • Heat transfer mechanisms, • Change in state, Triple point, • Measurement units.	**20%**
2	**Module II Heat and Thermodynamics**	
	• Mechanical Equivalent of Heat (Joule's Experiment) • First, second and third Laws of thermodynamics • Isothermal process, Adiabatic Process, Isochoric Process, Isobaric Process • Reversible and irreversible process • Carnot's Theorem, Carnot's Engine and refrigerator • Clapeyron Latent heat equation • Entropy	**20%**

3	**Module III Transmission of Heat**	
	• Coefficient of Thermal conductivity • Heat flow through a compound wall, • Wiedemann-Franz Law • Black body • Kirchhoff's Laws of heat radiation, Stefan's Law • Prevost theory of heat exchange • Wien's displacement Law, Rayleigh-Jean's Law, Plank's Law • Solar Constant, Temperature of Sun.	**20%**
4	**Module IV Basic Applications and Instruments of Thermal Engineering**	
	• Applications of conduction, convection and radiation heat transfer • Central heating system • Ammonia Ice Plant • Differential Air Thermoscope • Thermometers • Lummer and Kurlbaum Bolometer • Thermocouples and Thermopiles • Pyrheliometer • Light intensity meters • Steam engine, Diesel Engine, multi-cylinder engine	**20%**
5	**Module V Statistical Thermodynamics and Methods**	
	• Statistical Mechanics • Statistical equilibrium • Maxwell-Boltzmann Distribution Law • Maxwell-Boltzmann Distribution in terms of temperature • Maxwell-Boltzmann Distribution and ideal gas • Quantum statistics • Fermi-Dirac Distribution Law, Bose-Einstein Distribution • Statistical Calculations and Methods.	**20%**

Student Learning Outcomes:

- To demonstrate knowledge of thermal engineering.
- To describe basic applications and instruments of thermal engineering.
- To analyze Indian solar radiation and their possible applications.
- To explain heat transfer engineering concepts in renewable energy systems.
- To apply engineering materials in renewable Energy/ power generation

Pedagogy for Course Delivery:
The class will be taught using theory from standard text books covering the syllabus. In addition the course instructor will update the knowledge of latest state of art of the respective subjects from various media. The instructor will cover the ways to think innovatively and liberally.

Lab/ Practical Details, if applicable: NA

List of Experiments: NA

Assessment/ Examination Scheme:

Internal Assessment		**Total**
Theory L/T (%)	**Lab/Practical/Studio (%)**	
100	NA	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					**End Term Examination**
Components (Drop down)	Mid-Term Exam	Home Assignment	Viva	Attendance	
Weightage (%)	15	5	5	5	70

Text Readings:

1. **Mark W. Zemansky and Richard H. Dittman – Heat and Thermodynamics: An Intermediate Textbook**
2. **Brij Lal and N. Subrahmanyam - Heat and Thermodynamics**
3. **Frank W. Schmidt, R.E. Henderson and C.H. Wolgemuth – Introduction to Thermal Sciences**

Kerson Huang – Statistical Mechanics

References: NA

Additional Readings: NA

Any other study material: NA