

Indian Institute of Technology Kanpur
Proposal for a New Course

1. Course No: CHE 602A
2. Course Title: Introduction to Thermodynamics
3. Per Week Lectures: 3 (L), Tutorial: 0 (T), Laboratory: 0 (P), Additional Hours[0-2]: 0 (A),
Credits (3-0-0-0) Duration of Course: Full semester
4. Proposing Department: Department of Chemical Engineering

Other Departments/IDPs which may be interested in the proposed course: ME, AE, MSE

Other faculty members interested in teaching the proposed course: Vishal Agarwal, Soumik Das, Goutam Deo and Salman Khan

5. Proposing Instructor(s): Indranil Saha Dalal, Vishal Agarwal, Soumik Das, Goutam Deo and Salman Khan

6. Course Description:

A) Objectives: The aim of this course is to introduce the key concepts of Chemical Engineering Thermodynamics to students with diverse backgrounds. Particularly, this course is useful for graduate students of allied branches who are interested in postgraduate programs in the chemical engineering department.

B) Contents (preferably in the form of 5 to 10 broad titles):

Lecture-wise break-up (considering the duration of each lecture is 50 minutes)

S. No.	Broad Title	Topics	No. of Lectures
1.	Introduction and First law	Heat, Work, conservation of mass and energy, Equilibrium state, intensive and extensive variables, Applications	2
2.	Second law and Entropy	Entropy, Reversibility, Entropy changes of matter, Applications	3
3.	Thermodynamic properties of real substances	Corresponding states, Generalized equations of state, thermodynamic partial derivatives, thermodynamic property evaluations on change of state	4
4.	Equilibrium in one-component systems	Criterion for Equilibrium, Molar Gibbs energy and Fugacity of a pure component, Calculation of fluid-phase equilibrium – vapor pressure, Gibbs phase rule for one component system, Thermodynamic properties of phase transitions	5
5.	Thermodynamics of multicomponent mixtures	Partial molar properties, Gibbs Duhem equation, ideal solution and excess molar properties, Activity coefficients and models	4
6.	Chemical Reaction Equilibrium	Equilibrium in single phase system, homogeneous chemical reactions	2

C) Recommended pre-requisites, if any: None

D) Short summary for including in the Courses of Study Booklet:

First and Second law, Entropy, Thermodynamic properties of single and multicomponent systems, chemical reaction equilibrium

7. Recommended text/reference books:

1. Stanley I. Sandler, Chemical, Biochemical and Engineering Thermodynamics, John Wiley & Sons, 4th Edition.
2. J. M. Smith, H. C. Van Ness and M. M. Abbott, Introduction to Chemical Engineering Thermodynamics, 6th Edition.
3. Y. V. C. Rao, Chemical Engineering Thermodynamics, Universities Press, 1st Edition.

8. Any other remarks: None

Dated: 12/7/2024

Proposer: Indranil Saha Dalal

Dated:

DPGC Convener:

The course is approved / not approved

Chairman, SUGC

Dated: 27/09/2022