2017 REEMS REU SUMMER SEMINAR SERIES

Seminar Coordinator

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Primary Seminar Meeting:

HCC Admin Building
3100 Main Street, 2nd Floor Seminar Rooms

Seminar Room Locations:

June 9, Seminar Room B
June 16, Seminar Room B
June 23, Seminar Room A - Guest Lecture Dr. Jack Agee
June 30, Seminar Room C
July 7, Seminar Room C
July 14, Seminar Room C
July 21 Seminar Room C
July 28, Seminar Room C

Day and Time:
June 9 – July 28
Every Friday, 9 -11 AM

Guest Lecture

Additional Meeting Location
Rice University
Meeting Date, Building and Room To Be Announced on June 2

TEXT

Thermodynamics Kept Simple – A Molecular Approach: What is the Driving Force in the World of Molecules?
Roland Kjellander
eBook
$48.97
eBook Rental
from $31.00

VitalSource eBook access code and instructions will be provided within the print book.
https://www.crcpress.com/Thermodynamics-Kept-Simple-A-Molecular-Approach-What-is-the-

Driving/Kjellander/p/book/9781482244106

August 25, 2015 by CRC Press
Textbook - 233 Pages - 115 B/W Illustrations
ISBN 9781482244106 - CAT# K23467

Seminar Schedule and Content

Friday, June 2, 2017
Seminar Structure (Subject to Modification)
Introduction

Understanding of Spontaneity, Entropy, Free Energy, Temperature and Additional Relevant Thermodynamics Concepts from a Molecular Perspective and Transitioning to Materials Science

Friday, June 9 & June 16 2017
Chapter 2
Energy and entropy

- In the world of molecules: Movements, interactions and energy
- Self-evident matters? Spreading and spontaneity
- Particle locations: Macroscopic and microscopic states
- Two independent systems: The concept of entropy
- Gas diffusion: Mixing gases
- Dispersion of energy: Energy distribution and entropy
- Hotter and colder: The concept of temperature; the second and third laws of thermodynamics
- Availability of energy: The Boltzmann factor

Friday, June 23 & June 30
Entropy and free energy

- Poorly soluble substance: Particle positions and energy
- Evaporation of a liquid drop: Balance between entropy and energy; vapor pressure
- Combustion of magnesium: Exothermic reaction with loss of S_{conf}
- Burning candle: Exothermic reaction with gain in S_{conf}
- It gets cold: Endothermic reaction
- Colloidal stability: Repulsion driven by entropy
- What is the driving force? Total entropy of the system and the surroundings
- To indirectly keep track of the surroundings: The concept of free energy

Friday, July 7 & 14
More on gases and the basics of thermodynamics

- Bike pumps and fridges: Gas compression, pressure and work
- To work and to heat: Definition of work and heat; the first law of thermodynamics

- To work quickly or slowly: Entropy during volume changes; reversible work and the second law
- The gas follows the law: The ideal gas law
- To heat the kettle: Heat capacity
- The balance of two bank accounts: The concept of enthalpy
- Spontaneity for the most common circumstances: The concept of Gibbs energy

Friday, July 21 & 28
Mixtures and reactions

- Take from the bottle and mix Gas mixtures and standard states
- Can they react? Chemical reactions and equilibria

Phases and temperature variations

- To boil and to freeze: Phase transitions
- It depends on the temperature: Temperature dependence of various quantities