ME-351 : Thermodynamics and Energetics - II

Lecture 1 : Introduction

COURSE DETAILS | WHAT IS THERMODYNAMICS? | BASIC DEFINITIONS | STATE & PATH VARIABLES | FIRST LAW OF THERMODYNAMICS

Anirudh Raju Natarajan

anirudh.natarajan@epfl.ch

EPFL

LABORATORY OF MATERIALS DESIGN AND SIMULATION

Introduction & Course organization

Location : MAA 112
Lectures : 15:15 – 17:00
Excercises : 17:15 – 18:00
Office Hours : *By appointment* (Friday 14:00-16:00)

Assistants : Deepak Somani (deepak.somani@epfl.ch)
Damien Lee (damien.lee@epfl.ch)
Course Language : English

References:

- Principles of Classical Thermodynamics: Applied to Materials Science Didier de Fontaine (Available online through the library!)
- Introduction to the Thermodynamics of Materials : David R. Gaskell, David E. Laughlin

- Fundamentals of engineering thermodynamics : Moran and Shapiro
- An Introduction to Statistical Thermodynamics : D. Chandler
- Thermodynamics and an Introduction to Thermostatistics : Herbert B. Callen

3 credits ~ 3 x 30 hours = 90 hours
14 x 3 hours of lectures/exercise → 48 hours at home/library ~ 3.5 hours a week

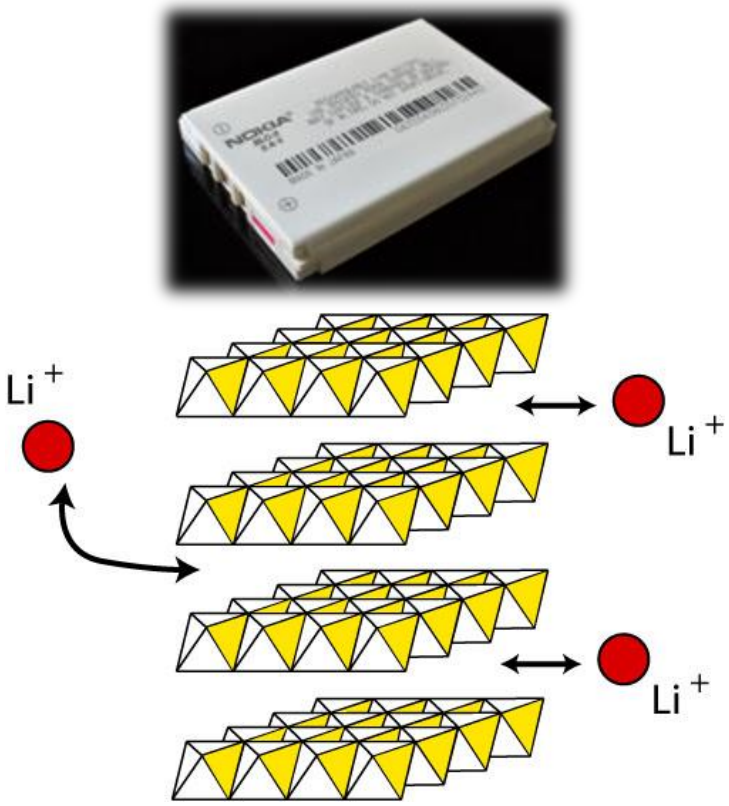
Midterm Exam : *40 % of the grade*
Final Exam : *60 % of the grade*
Final exam during the exam month. Date and location will be announced as soon as they are available.
Students will be provided with a single formula sheet along the with the exam. No other papers/exam aids are allowed or required.

Thermodynamics & Energetics - II

This course will discuss *advanced topics in thermodynamics* with a focus on studying *gas phases, mixtures, phase transformations and combustion*. The application of these principles to various practical systems such as *batteries, fuel cells etc.* will be discussed.

Energy generation

Materials



Energy storage

Thermodynamics & Energetics - II

This course will discuss *advanced topics in thermodynamics* with a focus on studying *gas phases, mixtures, phase transformations and combustion*. The application of these principles to various practical systems such as *batteries, fuel cells etc.* will be discussed.

What do these have in common?

Course organization

Date	Topic
February 18	Introduction, overview, basic definitions, equilibrium & state variables, reversible work *(No exercise session)*
February 25	First law, heat capacity, Second law of thermodynamics
March 4	Mathematical structure of thermodynamics *(No exercise session)*
March 11	Equilibrium criteria
March 18	Phase transformations *(No exercise session)*
March 25	*Exercise session from 15:15 – 16:45 (No lecture)*
April 1	Multi-phase systems *(No exercise session)*
April 8	Solution equilibria - I
April 15	**Midterm examination (Room TBD)**
April 22	*Mid-semester break (No lecture)*
April 29	Solution equilibria – II
May 6	Multicomponent phase diagrams
May 13	Introduction to statistical mechanics
May 20	Canonical ensemble, probability distribution, partition function
May 27	Statistical mechanical interpretation of entropy, General structure of statistical mechanics

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Reading material for the first 2 lectures:
Chapters 1-4 of de Fontaine