

Syllabus Thermodynamics

Second course

Biomedical Engineering

LECTURE 1

- INTRODUCTION & BASIC CONCEPTS – (THERMODYNAMICS AND ENERGY, IMPORTANCE OF DIMENSIONS AND UNITS, SYSTEMS AND CONTROL VOLUMES, PROPERTIES OF A SYSTEM & DENSITY AND SPECIFIC GRAVITY)

LECTURE 2

- BASIC CONCEPTS – (STATE AND EQUILIBRIUM, PROCESSES AND CYCLES, TEMPERATURE AND THE ZEROth LAW OF THERMODYNAMICS & PRESSURE)

LECTURE 3

- ENERGY - ENERGY TRANSFER, & GENERAL ENERGY ANALYSIS (FORMS OF ENERGY, ENERGY TRANSFER BY HEAT, ENERGY TRANSFER BY WORK & MECHANICAL FORMS OF WORK)

LECTURE 4

- THE FIRST LAW OF THERMODYNAMICS
- ENERGY CONVERSION EFFICIENCIES

LECTURE 5

- TOPIC OF SPECIAL INTEREST – MECHANISMS OF HEAT TRANSFER

LECTURE 6

- PURE SUBSTANCE - PHASES OF A PURE SUBSTANCE (PHASE-CHANGE PROCESSES OF PURE SUBSTANCES & PROPERTY DIAGRAMS FOR PHASE-CHANGE PROCESSES)

LECTURE 7

- PROPERTY OF STEAM TABLES
- THE IDEAL-GAS EQUATION OF STATE

LECTURE 8

- ENERGY ANALYSIS OF CLOSED SYSTEMS (MOVING BOUNDARY WORK, ENERGY BALANCE FOR CLOSED SYSTEMS & SPECIFIC HEATS)

LECTURE 9

- INTERNAL ENERGY, ENTHALPY, AND SPECIFIC
- INTERNAL ENERGY, ENTHALPY, AND SPECIFIC HEATS OF SOLIDS AND LIQUID

LECTURE 10

- TOPIC OF SPECIAL INTEREST – THERMODYNAMIC ASPECTS OF BIOLOGICAL SYSTEMS (FOOD AND EXERCISE & DIETING)

LECTURE 11

- MASS AND ENERGY ANALYSIS OF CONTROL VOLUMES – (CONSERVATION OF MASS & FLOW WORK AND THE ENERGY OF A FLOWING FLUID)

LECTURE 12

- ENERGY ANALYSIS OF STEADY-FLOW SYSTEMS
- SOME STEADY-FLOW ENGINEERING DEVICES
- ENERGY ANALYSIS OF UNSTEADY-FLOW PROCESSES