

## CHEMICAL ENGINEERING THERMODYNAMICS

### 1.1. Identification

University:	Alma Mater Studiorum – Università di Bologna												
School:	School of Engineering												
Course:	Chemical Engineering Thermodynamics												
ECTS:	6												
Semester:	<i>Winter</i>				X	<i>Summer</i>							
Category	<i>Fundamental course</i>					X	<i>Specialisation course</i>						
Module	<i>MFI</i>	X	<i>MFII</i>		<i>MFIII</i>		<i>MSI</i>		<i>MSII</i>		<i>MSIII</i>		
Teachers:	Ferruccio Doghieri, Marco Giacinti												
Language:	<i>English</i>	X	<i>Italian</i>	X	<i>Swedish</i>		<i>Spanish</i>						

### 1.2. Learning-outcomes

- knowledge about thermodynamic properties of fluids and fluid mixture and their use in phase equilibrium and reaction problems
- knowledge about the fundamentals of thermodynamic analysis

### 1.3. Competencies

#### ▪ General

- to have critical understanding of technical and scientific tools
- communication skills
- to work in an international context

#### ▪ Specific

- to understand significance of thermodynamic properties in PVT and dielectric or magnetic materials
- to perform complete thermodynamic analysis to compare efficiency of difference processes
- to predict relevant properties of fluids and fluid mixtures on the basis of a minimum of key experimental data

### 1.4. Contents

1. Deformation work in different systems: PVT, dielectrical, magnetic, elastic, confined systems

2. Resume of classical thermodynamics: first and second law. Third law of thermodynamics
3. Thermodynamic analysis of processes: Exergy and availability functions
4. Basic concepts of Statistical Thermodynamics
5. Equations of state for fluid and fluid mixtures
6. Solution of phase equilibrium problems in binary systems through EoS
7. Thermodynamic of polymeric materials and polymer solutions

### **1.5. Teaching Methodology**

- Lectures
- Practical sessions: “cooperative work” for solving problems

### **1.6. Evaluation**

- project work
- oral examination

### **1.7. Bibliography**

- 1.S. Sandler, Chemical and Engineering Thermodynamics, third edition, Wiley, 1999
- 2.D.R.Gaskell, Introduction to the Thermodynamics of Materials, Taylor and Francis, 2003