Course specifications

Programme(s) on which the course is given: B.Sc. chemistry
Major or minor element of programmes: Major
Department offering the programme: chemistry
Department offering the course: chemistry
Prerequisite: CH111
Academic year / Level: Second
Date of specification approval: 2013

A- Basic Information

Title: Thermodynamics Code: CH 211

Credit Hours: 2 Lecture:1.5
Tutorial: 1 Practical: 2 Total: 2
Teaching staff: Dr. / Ayman Shiebl Diab.

B- Professional Information

1 – Overall aims of course

- Introduce the basic concepts of thermodynamic.
- Introduce an idea about the maximum work and chemical.
- Study the second law of thermodynamics and its applications
- Learn the importance and the application of thermodynamics to changes of states.

2 – Intended learning outcomes of course (ILOs)

a- Knowledge and understanding:

The graduate should be able after completing the course to

-Understand why some chemical reactions takes place.
- Differentiate between the first and second laws.
- Recognize the definition and the significance of thermodynamic functions.

b- Intellectual skills

b1- Apply the thermodynamic laws.
b2- Predict and calculate the thermodynamic properties of a solution.

b3- Analysis many of natural phenomena that take place,

b4- Explaining them from thermodynamic point of view .

b5- Evaluate the absolute total energy of the system.

c- Professional and practical skills

c1- Solve problems of different laws

c2- Make regular presentations for the discussion of many related titles or subjects.

d- General and transferable skills

- Improve the skills especially in thinking, mutual discussions and oral presentation.

- Work independently and effectively on solving physical problems.

- Communicate effectively with their lectures and colleagues.

- Use IT and search for information.

3- Contents

Topic	No. of hours	Lecture	Tutorial/Practical
*The meaning of thermodynamics, its applications and limitations (simple introduction) * Difination of some thermodynamic terms and basic concepts. * Classification of systems according to the following a) nature of system matter. b) nature of boundary. *Bulk properties used for specification of systems under thermodynamic investigation.	2	1	

***Equilibrium and non-equilibrium states.**			
***Types of thermodynamic processes. * Differentiation between reversible and irreversible processes. *Nature of heat and work. * Types of work.**	**2**	**2**	
Fundamental thermodynamic parameters. *Definition of internal energy. * Statement of first law *Definition of enthalpy (H) at different conditions. * Molar heat capacity (C)	**2**	**3**	
*** Mathematical relationships between Cv and Cp for ideal and real gases. *Adiabatic relationships and Joule-Thomson effect. *Reversible adiabatic work expressions.**	**2**	**4**	
*** Definition of heat of reaction under isochoric and isobaric conditions. *Complete thermochemical equations. * Factors affecting the value of (∆H).**	**2**	**5**	
***Effect of temperature on (∆H) [Kirchoff´s equations]. *Theoretical indirect method for calculating (∆H). * Experimental defermunation (direct method of ∆H). * Types of calorimeters. – water**	**2**	**6**	

calorimeter. – bomb calorimeter.			
*** Definition of heat of formation and standard heat of formation. * Definition of heat of combustion. * Applications of heat of combustion. *Definition of heats of solution and neutralization.**	**2**	**7**	
***Law´s of thermochemistry a) Lavoisieur and La place b) Hess´s law. * Discution of some Hess´s law applications. * Aspects of criticism of first law. * Bond energy , atomization energy.**	**2**	**8**	
*** Spontaneous changes. * General properties of spontaneous events. *Physical definition of entropy (s). * Numerical definition of entropy (claussius definition).**	**2**	**9**	
***Second law of thermodynamic * Statement of third law and study the effect of temperature on the value of the absolute entropy. * Entropy change of an ideal gas. * Entropy change of ideal gases mixing.**	**2**	**10**	
***Heat engines and Caront**	**2**	**11**	

cycle. * Gibbs-Helmholtz equation. *Claussius-Clapeyron equation			

4– Teaching and learning methods

1- Lectures

2- Problem classes and group tutorial.

3- Home works, reports and discussion groups.

5- Graduate assessment methods

1- short exam to assess general performance of graduates.

2 - Mid term to assess the Mid – course performance

3 – Final term to assess the all course performance

Assessment schedule

Assessment 1 short exam every two weeks.

Assessment 2 mid-term week in the 7th week

Assessment 3 Final-exam week after 14 weeks from the starting of the term.

Weighting of assessments

Mid-Term Examination (written + practical) 20 %

Final-term Examination (written + practical) 60 %

Oral Examination. 20 %

Semester Work (written + practical)

Other types of assessment

Total 100%

Any formative only assessments

6- List of references

1- Robert G. Mortimer (2008). Physical Chemistry ,Third Edition, Elsevier Academic Press, USA.

7- Facilities required for teaching and learning

providing the lectures rooms with some tools which are essential for teaching like wirless mics and overhead projectors.

Course coordinator: Dr / Ayman Diab.

Head of Department: Prof. Dr. Adel A. Nassar

Date: / /