Kingdom of Saudi Arabia

The National Commission for

Academic Accreditation & Assessment

COURSE SPECIFICATION

(Physical Chemistry 1 /402281-2)

1435 / 1436 H

Course Specification

Institution: **Umm Al-Qura University**
College/Department: **Applied Science /Chemistry Department**

A. Course Identification and General Information

1. Course title and code: **Physical Chemistry 1 /402281-2**
2. Credit hours: **2h**
3. Program(s) in which the course is offered. (If general elective available in many programs indicate this rather than list programs) **Industrial Chemistry**
4. Name of faculty member responsible for the course: **Dr. Abd El ahman Salah Khder**
5. Level/year at which this course is offered: **4th level/ Second year**
6. Pre-requisites for this course (if any): **General Chemistry 402101-4**
7. Co-requisites for this course (if any): ——
8. Location if not on main campus: ——

B. Objectives

1. Summary of the main learning outcomes for students enrolled in the course: By the end of the study of this course, the students familiar with the basic concepts of thermodynamics including study of different laws of thermodynamics and physical concepts and their importance and their applications in various fields and study on automatic processes linked to the physical constants and thermal dynamic functions.
2. **Briefly describe any plans for developing and improving the course** that are being implemented. (eg increased use of IT or web based reference material, changes in content as a result of new research in the field) - Using teaching smart lecture halls. - Encourage students to work in the area of thermodynamics reports both from the library or using the Internet (self-teaching).

C. Course Description: (Note: General description in the form to be used for the Bulletin or Handbook should be attached)

1. Topics to be Covered		
Topic	No of Weeks	Contact hours
Introduction to the objectives of the study of thermodynamics and some terminology thermodynamics	**1**	**2**
Heat and energy and energy (the equivalent mechanical thermal) and different types of systems.	**1**	**2**
Thermodynamics variables and characteristics of focused and private flat and thermodynamics processes.	**1**	**2**
Zero and first laws of thermodynamics and applications	**1**	**2**
The relationship between change in enthalpy and change in internal energy — thermal capacity.	**1**	**2**
The influence of Jules-Thompson and adiabatic and isothermal expansions - set the coefficient of heat capacity measurements of Joul.	**1**	**2**
Thermochemistry-Exothermic and endothermic reactions -Act krishoff Act of Hesse and its applications.	**1**	**2**
The second law of thermodynamics and its applications-spontaneous and non spontaneous processes-Heat machines and thermal efficiency.	**1**	**2**
Midterm Exam.	**1**	**2**
Heat transfer to work-Carnot cycle (efficiency and compression ratio) cycle of Otto.	**1**	**2**
Entropy-Gibbs free Energy and work function- Gibbs –Helmholtz Equation	**1**	**2**
Vant Hoff Equations-Chemically Equilibrium and spontaneousity.	**1**	**2**
Third law of thermodynamics and its applications.	**1**	**2**
General revision and tests	**1**	**2**

2. **Course components** (total contact hours per semester):

Lecture: **28**	Tutorial:	Practical/Fieldwork/Internship:	Other:

3. Additional private study/learning hours expected for students per week. (This should be an average for the semester not a specific requirement in each week)

Sunday: from 10-12 noon and Tuesday: 10-12 noon

4. Development of Learning Outcomes in Domains of Learning

For each of the domains of learning shown below indicate:

- A brief summary of the knowledge or skill the course is intended to develop;
- A description of the teaching strategies to be used in the course to develop that knowledge or skill;
- The methods of student assessment to be used in the course to evaluate learning outcomes in the domain concerned.

a. Knowledge

(i) Description of the knowledge to be acquired

- Split systems and various dynamic processes.
- Identify the different terminology thermodynamics functions.
- Identify relationships between various energy images and especially mechanical and thermal power (work).
- Thermal effects such as Joul-Thompson and the adiabatic and isothermal extensions.
- Writing thermal equations and exothermic and exothermic reactions.
- Knowledge and understanding of the law I and II and III of thermodynamics and their applications.
- Explain and interpret the relationship between chemical equilibrium and spontaneousity.
- Learn how to convert heat to work.
- Discover the relationship between temperature and heat interaction through writing the laws of Krishoff.

(ii) Teaching strategies to be used to develop that knowledge

• Scientific discussions and work in small groups.

• Use the library for research work on some topics of applied thermodynamics.

• Use of the Internet in some public reports of ways set the heat interaction and thermal capacity.
(iii) Methods of assessment of knowledge acquired • Final exams and written mid-semester. • Oral examinations. • Real-time discussions. • Systematic research in the subject of the decision.
b. Cognitive Skills
(i) Cognitive skills to be developed • Reverse thinking skill development (thinking back) and to acquire student skill training to choose appropriate ways to set the heat of formation of compounds. • Acquire student skill forecasting operation of reaction and its path based on the relationship between chemical equilibrium and spontaneous interactions through knowing values of dynamic functions. • Student skill acquired how to discuss the change in enthalpy values and the heat of formation of compounds.
(ii) Teaching strategies to be used to develop these cognitive skills 1. Students can pick the appropriate ways to set functions thermodynamics associated with chemical reactions. 2. Design of different ways to set the amplitude of thermal and heat of the reaction. 3. Student innovates for different ideas to study different thermodynamic systems. 4. The student plans to work in the area of thermodynamics research according to the steps. 5. Student relate between each of the energy images. 6. The student compares between different types of systems and processes in thermodynamics.
(iii) Methods of assessment of students cognitive skills -Tests. -Measure the response of assignments
c. Interpersonal Skills and Responsibility
(i) Description of the interpersonal skills and capacity to carry responsibility to be developed - Division of the students to collective teams to conduct some joint reports.

- Development of student opinion accepts colleague attending to do effective presentation topic is linked to decision, and evaluate results to discover the responsiveness of students collective cooperation.

(ii) Teaching strategies to be used to develop these skills and abilities

- Divide the students into groups of common collective research.
- Commissioned analysis and interpretation of research in a panel discussion.
- See sample reports to discuss collective research students.

(iii) Methods of assessment of students interpersonal skills and capacity to carry responsibility

-Evaluation of results and analyses of laboratory experiments and find out the contribution of each individual in interpretation through dialogue and discussion.

d. Communication, Information Technology and Numerical Skills

(i) Description of the skills to be developed in this domain.

- Use of computer in compiling research help writing reports on topics relevant to the decision.
- Using the computer and the Internet to identify sources of recent research relevant to the course.

(ii) Teaching strategies to be used to develop these skills

- Use computer lab.
- Visit Central Library
- Visit research centres.
- Use international information network.

(iii) Methods of assessment of students numerical and communication skills

- Put in questions tests simple explanation of statistical information.
- Assessing duties associated with proper use of communication and numerical skills.
- Allocate part of the ratings to assess the level of ICT use in rendering.

e. Psychomotor Skills (if applicable)

(i) Description of the psychomotor skills to be developed and the level of performance required:

None

(ii) Teaching strategies to be used to develop these skills

None

(iii) Methods of assessment of students psychomotor skills **None**

5. Schedule of Assessment Tasks for Students During the Semester:			
Assessment	**Assessment task (eg. essay, test, group project, examination etc.)**	**Week due**	**Proportion of Final Assessment**
1	Class activities, Attendances and Duties	Throughout the Term	**10%**
2	Mid-Term Exam (s)	5-14	**40%**
3	Final Exam	End of the Term	**50%**
4	**Total**		**100%**

D. Student Support

1. Arrangements for availability of faculty for individual student consultations and academic advice. (include amount of time faculty are available each week) - Presence of faculty members to provide counselling and advice. - Office hours: during the workweek, and creating the appropriate means. - Academic advising for students who need it, and test the appropriate member.

E. Learning Resources

1. **Required Text(s):** • Note of thermodynamics (Professor article).
2. Essential References • ATKINS' Physical Chemistry, Peter Atkins and Julio de Paula, 7 th ed., Oxford University press, New York, 2010. • Physical Chemistry, Ira N. Levine, 6 th ed., McGraw-Hill Education, Boston, 2009.
3- **Recommended Books** and Reference Material (Journals, Reports, etc) (Attach List) • Thermodynamics: an engineering approach, Yunus A. Cengel and Michael A. Boles, 7 th. SI ed., McGraw- Hill, London, 2011.
4-.Electronic Materials, Web Sites etc

- http://en.wikipedia.org/wiki/Petroleum1- http://www.chemhelper.com/
- http://www.chemweb.com/
- http://www.science.uwaterloo.ca/~cchieh/cact/
- http://www.sciencedirect.com/

5- **Other learning material** such as computer-based programs/CD, professional standards/ regulations

- Microsoft PowerPoint, Microsoft Word
- Video tapes and DVDs related to thermodynamics

F. Facilities Required

Indicate requirements for the course including size of classrooms and laboratories (ie number of seats in classrooms and laboratories, extent of computer access etc.)

1. Accommodation (Lecture rooms, laboratories, etc.)

- Classroom capacity (30) students.
- Processing Hall in appropriate educational means, including computers.

2. Computing resources

Room equipped with computer and data show

3. Other resources (specify --eg. If specific laboratory equipment is required, list requirements or attach list)

G Course Evaluation and Improvement Processes

1- Strategies for Obtaining Student Feedback on Effectiveness of Teaching

- Complete the identification of the course.
- Focus the discussions with small groups of students

2- Other Strategies for Evaluation of Teaching by the Instructor or by the Department

- Observations and assistance from colleagues.
- Independent assessment of the extent to which standards students.
- Independent advice for the duties and tasks.

3- Processes for Improvement of Teaching

- Workshops for teaching methods.

- Continuous training of the faculty member.
- Revision of the proposed strategies.
- To provide modern tools to learn.
- Application means learning.
- Exchange experience both internal and external.

4. Processes for Verifying Standards of Student Achievement (eg. check marking by an independent faculty member of a sample of student work, periodic exchange and remarking of a sample of assignments with a faculty member in another institution)

- Check the patch sample of test papers, or the work of students.

– Professor of the course correct sample patch exchange of duties or tests periodically with another Member of the teaching staff of the same course in other educational institution.

5- Describe the planning arrangements for periodically reviewing course effectiveness and planning for improvement.

- Consult the other course professors.
- Host a visiting professor to rectify the decision.
- Workshops for professors.
- Periodic review of the contents of the course and amend the negatives.