Course Specifications

Program: M.Sc. Inorganic Chemistry (major)
Level: Graduate

A. Basic Information

Title: **Symmetry and Chemical applications**
Code: **CH6219** **Credit hours:** **2 h**
Lecture: **2h/week** **Tutorial:** **0** **Practices:**
Academic year : 2012

B. Professional Information:

1. Overall Amis of the course: by the end of the course the student will be able to

- Use of symmetry argument to the typical experimental chemistry.
- Study applications of symmetry in chemistry

2. Intended Learning outcomes of the course (ILOs), after completing this course the student will be able to:

i. know and understand:

- identify symmetry elements and operations
- discuss the symmetry point group
- present some immediate applications
- illustrate properties of the groups and their elements
- show similarity Transforms, Conjugation, and Classes
- present matrices and Vectors
- state matrix Representation of Symmetry Operation
- clarify matrix Representation of Point Group
- differentiate between reducible and Irreducible Representations
- discuss motion representations of the groups
- show character Tables
- Recognize properties of the Characters of Representations
- Clarify relation between any reducible representation of a group and the irreducible representations of that group

ii. gain intellectual skills such as:

- analyze hybridization of atomic orbitals
- illustrate symmetry Adapted Linear Combination (SALC)
- discuss symmetry Aspects of Molecular Orbital Theory
- explain symmetry and Ligand Field

iii. have professional and practical Skills such:

- interpret vibrational Rotational spectroscopy
- illustrate symmetry and Electronic Spectroscopy

iv. obtain general and transferable skills like:

- show bond strength and stereochemistry
- intending students to theoretical chemistry

3. Content

Topic	No. of hours	Lecture	Tutorial/Practica
Definitions and Theorems of Group Theory	**2**	**1**	**0**
Molecular Symmetry and the Symmetry Group	**6**	**3**	**0**
Representations of Groups	**4**	**2**	**0**
Group Theory and Quantum Mechanics	**1**	**2**	**0**
Hybrid Orbitals and Molecular orbitals for AB_n – type Molecules	**2**	**4**	**0**
Symmetry Adapted Linear Combination (	**1**	**2**	**0**
Molecular Vibrations	**4**	**2**	**0**
Symmetry and Electronic Spectroscopy	**4**	**2**	**0**

4. Teaching and Learning Methods:

Lectures,assignment and discussion

5. Student Assessment Methods:

written exam, open book exam and quizzes

Assessment Schedule

Assessment 1: on the fourth week
Assessment 2: on the sixth week
Assessment 3: on the ninth week
Assessment 4: on the tenth week
Assessment 5: on the twelfth week
Assessment 6: on the fourteenth week

Weighting of Assessments

Mid – Term Examination and oral exam: 20%
Semester work: 20%
Final – Term: 60%
Total: 100%

6. List of References:

a- Text books

F. A. Cotton: *Chemical application of Group theory*
B. P. Lever: *Inorganic Electronic spectroscopy*
C. Harris & M. D. Bertolucci: *Symmetry and spectroscopy*

7. Facilities Required for Teaching and Learning:

overhead projector, audio video projector, field visits and data show

Course Coordinator: Joseph J. Stephanos, Assoc. Prof.
Head of Department: Prof. Ahmad Abd El Migid

Date: 2012