Program: M.Sc. Inorganic Chemistry (major)

Level: Graduate

A. Basic Information

Title: Group theory
Code: CH6119 **Credit hours: 2 h**
Lecture: 2h/week Tutorial: 0 Practices: 0

B. Professional Information:

1. Overall Amis of the course:

- 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:

- Symmetry elements and operations
- Point group
- Properties of the groups and their elements
- Classes
- Matrices and Vectors
- Matrix Representation of Symmetry Operation
- Matrix Representation of Point Group
- Reducible and Irreducible Representations
- Character Tables

ii. Gain intellectual skills such as:

- Hybridization of atomic orbitals
- Symmetry Adapted Linear Combination (SALC)
- Symmetry Aspects of Molecular Orbital Theory
- Symmetry and Ligand Field

iii. Have professional and practical Skills such:

- Vibrational Rotational spectroscopy
- Symmetry and electronic Spectroscopy

iv. Obtain general and transferable skills such as:

- Information on bond strength, stereochemistry
- Introduction for students intending to do 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**
5. **Student Assessment Methods:**

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**

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:**

Data show

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

Date: 3/10/2010