**Department of Chemistry Syllabus**

This syllabi is advisory only. For details on a particular instructor's syllabus (including books), consult the instructor's course page. For a list of what courses are being taught each quarter, refer to the Courses page. *Every instructor has prerogative to teach the course as they see fit and ultimately the instructor's syllabus supersedes all others.*

***Chemistry 201. Symmetry and Group Theory***

Approved:

Suggested Textbook: (actual textbook varies by instructor; check your instructor)

1. F. Albert Cotton, Chemical Applications of Group Theory. Wiley-Interscience, 1990. ISBN 047151094-7

2. Daniel C. Harris and Michael D. Bertolucci, Symmetry and Spectroscopy, Dover Publications, Inc., 1978. ISBN: 048666144X

3. Roald Hoffmann, Solids and surfaces: A chemist's view of bonding in extended structures. Wiley-VCH, 1988. ISBN: 978-0-471-18710-3.

4. Gregory S. Gilorami. X-Ray Crystallography. University Science Books, U.S. ISBN: 9781891389771.

Suggested Schedule:

I. Symmetry elements and symmetry operations

II. Point group identification

III. Mathematical representation of point groups

IV. Character tables

V. Applications to IR and Raman spectra

VI. Applications to molecular orbital theory

VII. Applications to electronic spectroscopy

VIII. Crystallographic symmetry

IX. Electronic structure of Solids

Additional Notes:

Lecture--3 hours. Prerequisite: course 124A and 110B, or consent of instructor. Symmetry elements and operations, point groups, representations of groups. Applications to molecular orbital theory, ligand field theory, molecular vibrations, and angular momentum. Crystallographic symmetry. Electronic structure of solids.

Learning Goals:

After having successfully completed the course student is expected to be able to determine symmetry point group of the molecule, figure out irreducible representations of the point group, deconvolute reducible representations to sum of irreducible ones, predict number of vibrational bands and their symmetry in IR and Raman spectra of the molecule, construct a molecular orbital diagram for - and -bonding on a qualitative level, predict electronic spectrum of the molecule on a qualitative level, predict magnetic properties of the molecule, derived symmetry of three-dimensional infinite object, interpret band and density-of-state diagrams.