**Course Code: CHEM 150 B**

**Course Title: Introduction to Inorganic Chemistry**

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| Credit Hours | Credits 4, (3+1) |
| Prerequisite | F.Sc or A level Chemistry |
| Course Hours | Tuesday & Thursday: 12:30 pm - 1:45 pm in S-412  Lab.: Friday 11:00 am – 12:50am in S-138 |
| Office Hours | Monday & Wednesday 12:00 noon to 1:30pm |
| Teacher’s Name and Contact | **Dr. Shazma Massey Azeem**  Phone:0300-6181868  Email: [shazmaazeem@fcccollege.edu.pk](mailto:shazmaazeem@fcccollege.edu.pk) |

Catalog Description:

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| Various theories of bonding including valence bond theory, molecular orbital theory, Werner’s theory, crystal/ ligand field theory, three center bonds, bonding theory of metal and intermetallic compounds, bonding in electron deficient compounds, hydrogen bonding, shapes of molecules (VSEPR model). |

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| Course Objective(s) | Course Outcome(s) | Assessment(s) |
| 1. Students will have a complete knowledge of electronic structure of atoms, ions and molecules. 2. They will be able to explain bonding using different theories, which will make their basis strong in chemistry. 3. How color, magnetic behavior and stability of complexes is explained by crystal field theory. 4. To equip the students with the skills for determining the structure of molecules 5. Explain the shape of different molecules and effect of lone pair bond pair on bonding. | At the end of this course, the students are expected to:  1. Demonstrate the structure of different elements in the periodic table, applying different concepts such as electronic configuration, Auf Bau principle, Hund’s rule and quantum numbers.  2. Demonstrate different separation techniques.  3. Use VSEPR theory to calculate molecular geometry, lone pairs and bond pairs.  4. Explain basic  concepts of  primary and secondary valency according to Werners theory.  5. Apply their knowledge to calculate the crystal field stabilization energy.  6. Demonstrate  Presentation skill by presenting on some recent topic. | Class Test 15%  Mid 20%  Practical Exam 25%  Final 30%  Presentation/Assignment 10% |

Textbooks and References:

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| **Textbook Name + Edition** | **Author** | **Publisher** |
| Chemistry & Chemical Reactivity (7th Edition) | Kotz, Treichet & Townsend | Cengage Learning, 2014 |
| Inorganic Chemistry | M. Zafar Iqbal | Ilmi Kitab Khana |
| Chemistry the central science (12th Edition) | Brown, Eugene Lemay, Bursten, Murphy and Woodward | Inc. Pearson Education |
| Chemistry the molecular nature of matter and change (5th Edition) | Martin S. Silberberg | McGraw-Hill |

Syllabus breakdown in lectures:

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| **Week no.** | **Topic** | **Content Breakdown** |
|  | **Introduction, Electronic structure of atoms and molecules** | * Electronic Configuration on the basis of s, p, d, f configuration, Noble gas notation and box notation * Auf Bau principle * Hund’s rule * Quantum number * Pauli Exclusion Principle * Periodic Table |
|  | **Valence shell electron pair repulsion theory (VSEPR)** | * Postulates * VSEPR Theory applied to single bond and Ions * VSEPR Theory applied to the remaining geometries with single bonds * VSEPR Theory applied to double and triple bond |
|  | **VBT & Hybridization** | * Postulates * sp3, sp2,sp, d2sp3 or sp3d2, dsp3 |
|  | **MOT** | * Postulates * Applying to homomolecular molecules N2, O2, F2 * Applying to heteromolecules N2, O2, F2 * Ions eg. O2-2, F2+2 |
|  | **Werner’s theory** | * Postulates * Examples |
|  | **Crystal/ligand field theory** | * Postulates * Calculating CFSE * Applications of CFT |

Computer Usage:

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| Videos related to teaching topics, Moodle, Zoom, Assignment presentation |

Laboratory:

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| • Solution Making  a. Making solutions of given solids and liquids  b. Making solutions of various concentrations  c. Making dilutions from stock solution  • Volumetric Analysis  a. Standardization of different solutions  b. Determination of percentage purity and impurity of given solutions using phenolphthalein and methyl orange as indicator.  c. Determination of percentage composition of a given mixture using phenolphthalein and methyl orange as indicator.  d. Determination of the concentration of FeSO4 solution by titrating against molar solution  of KMnO4.  • pH Meter  a. Calibration of a pH meter  b. Determination of pH of different solutions (lemon juice, baking soda solution, washing soda solution and battery acid etc) by using digital pH/ion meter  • General Experiments  a- Explain the colors observed for various transition metal complexes on the basis of CFT with the help of UV-visible spectrophotometry. |

Teaching Method:

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| Lecture, discussion, assignments, videos |